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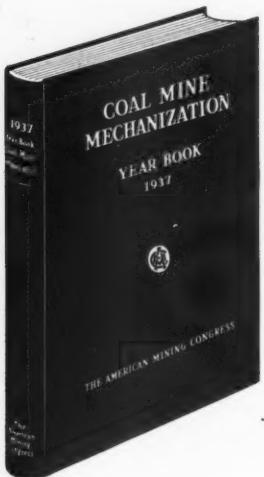
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SEPTEMBER, 1937

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Number 9

CONTENTS

EDITORIALS:

Page
23
24
24
24

The Price of Peace 23
Concerning Conventions 24
The Depletion Issue 24
Hopeful Silicosis Research 24

Practical Difficulties Resulting from the Surtax on Undistributed Profits 25

By Henry B. Fernald

Changing Standards in Underground Transport 50

By Lucien Eaton

The Work of the Bureau of Mines in Relation to the Metal Mining Industry 52

By John Wellington Finch

Notes on Mine Pumping Practice Cripple Creek District 56

By M. H. Salsbury

Activities of the United States Geological Survey Relating to Metal Mining 60

Sectionalizing Power by Automatic Circuit Breakers 64

By John T. Parker

The Lubrication of Coal Cutting and Loading Machinery 66

By Charles W. Frey and F. M. Hoferer

Wheels of Government 28

Statement of Mining Congressmen to House Committee on Labor
Opposing Graveyard Shift Features of Wage-Hour Bill 30

The Metal Mining Convention and Exposition 31

Official Program 42

Floor Plans and Exhibitors 46

Of All Things 49

Mechanization Trends 69

News and Views 71

Personals 74

With the Manufacturer 76

- IN OCTOBER -

A complete account
of the
Metal Mining Convention
and Exposition
at Salt Lake City.
Those unable to
attend can follow
important happenings
by reading this issue.

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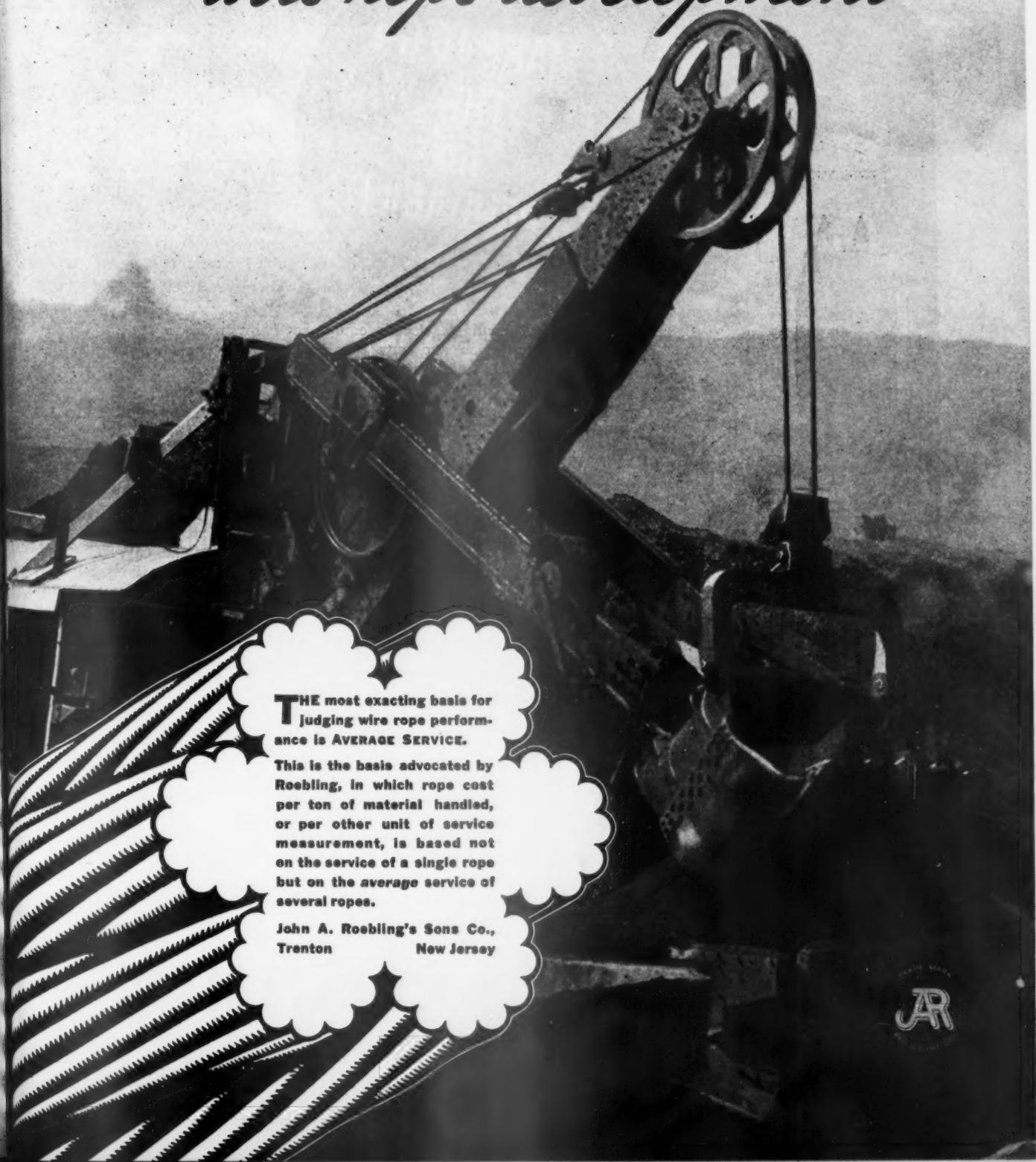
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Roebling... The pacemaker in wire rope development



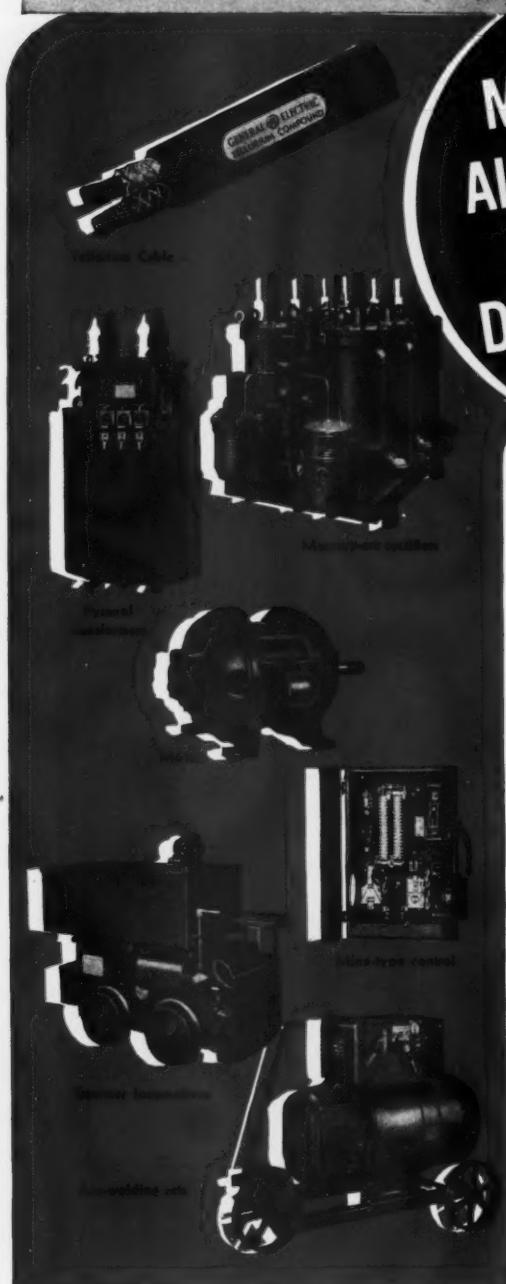
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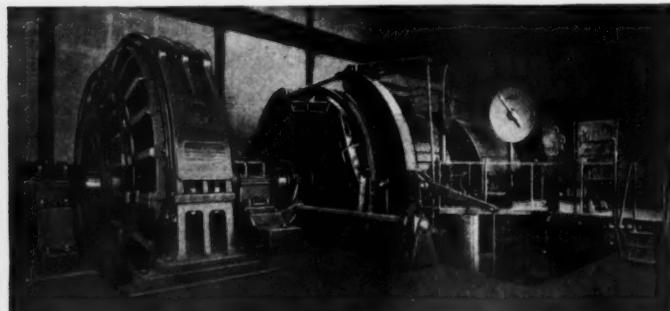
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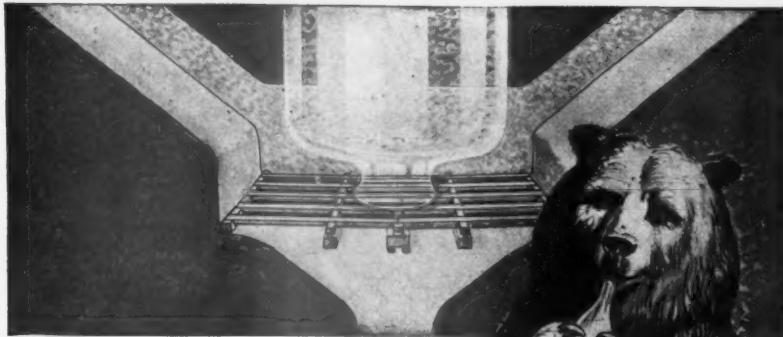


Main ore hoist in a Montana copper mine. Equipment includes G-E 2150-hp d-c motor, synchronous motor-generator set, and variable-voltage control

011-262

GENERAL ELECTRIC

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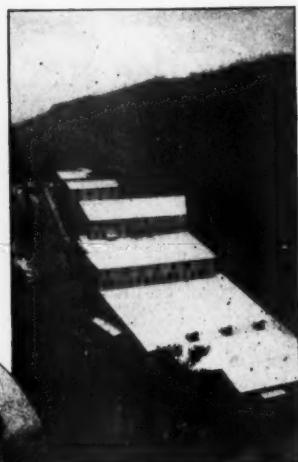


SEPTEMBER, 1937

Notes from a Cyanamid Field Engineers Notebook



Modern Mills: Balatoc Mining Company's 1200-ton cyanide plant, largest on the islands, is typical of the modern mills now operating in the Philippines.



Demonstration Gold Mines, Ltd., one of the many mills now installing Fagergren Flotation Machines to handle copper-bearing sulfide ores before cyaniding.



Beauty Note: Sturdy Igorot Native boys of the mountain provinces make fine miners. Under ground they wear only shoes and "skull protectors".



Battery of 36" Fagergren Flotation machines at United Paracale Mining Company (sulphide section). Gold and copper concentrates are treated by the new smelter at Mambulao.



AMERICAN CYANAMID
A Complete Metallurgical-
30 ROCKEFELLER PLAZA,

on

Philippine Ore Dressing Practise

Compressed into the few square miles that are the Philippines is a mining field that has literally "lifted itself by its own bootstraps". In 1915 only three mills were operating. Two decades later there were sixteen. Early in 1938 twenty-four modern plants will be operating at the rate of four million tons a year. Output, increased six-fold in the last ten years, is mushrooming upward with the continued introduction of the newer metallurgical processes and equipment.



West Australasian papers please copy: Philippine typhoons menace mountainside mills. Here shown is a concrete drainage canal running right thru the center of the Itogon Mining Company mill.



Not "As Advertised"—Many people think of the Philippines as a trackless humid jungle relieved by volcanic mountains. A picture of the golf course at Baguio . . . the most beautiful mining district I have seen—or expect to see.

Philippine recovery practise is making good use of flotation as an adjunct to cyanidation in the treatment of copper-bearing sulfide ores. Aerofloat Flotation Reagents are widely used and Fagergren Flotation machines are showing consistently good low-cost recovery.

* * *

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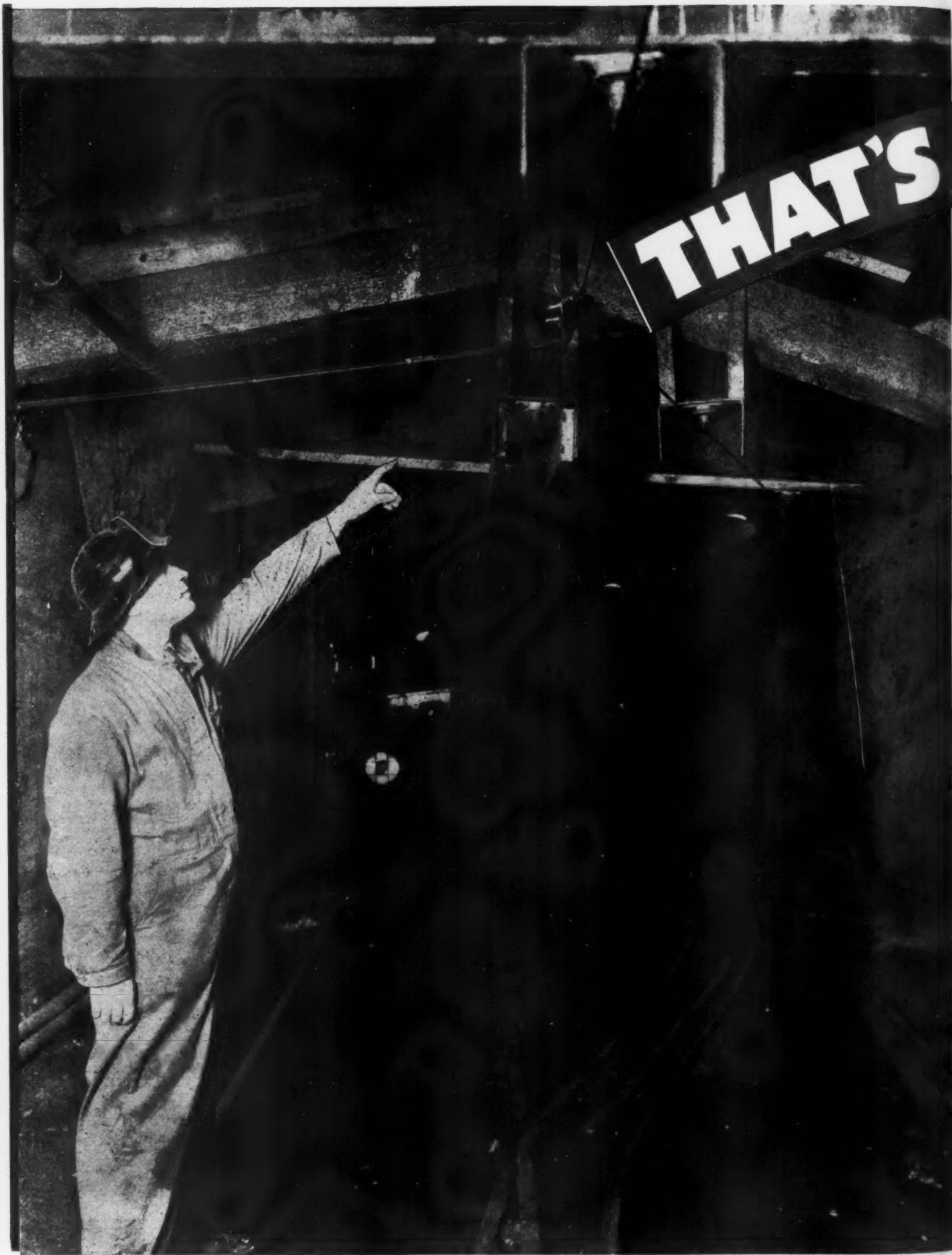
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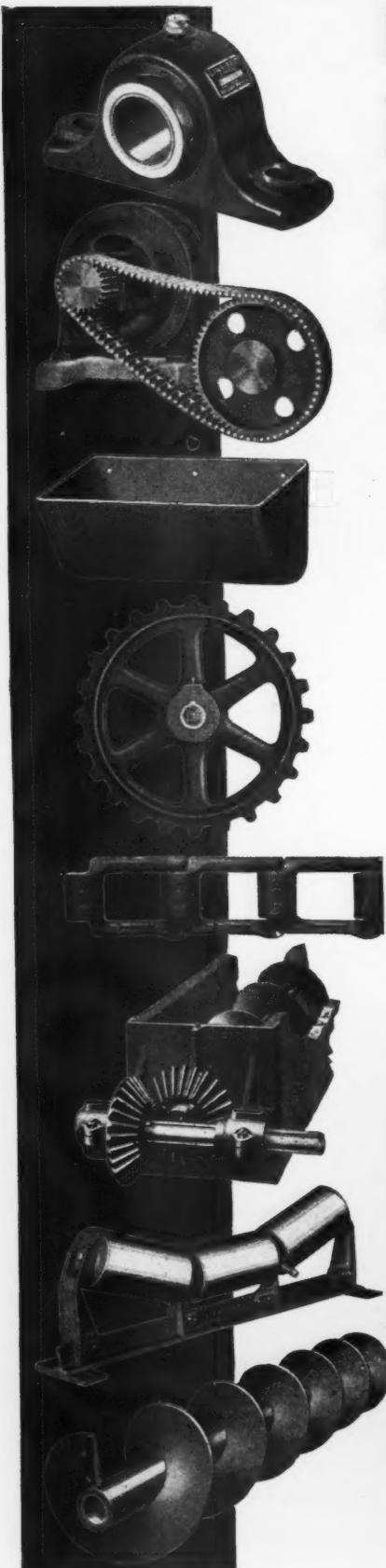


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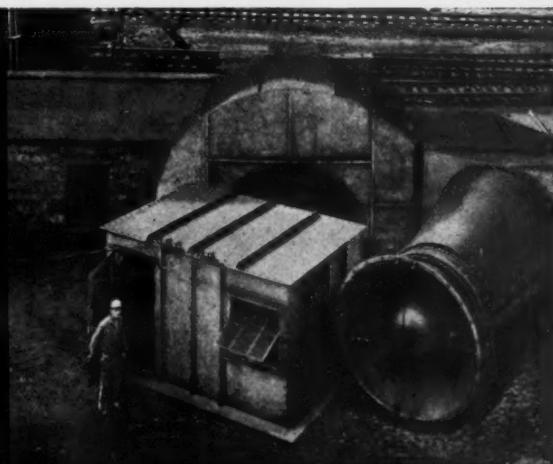
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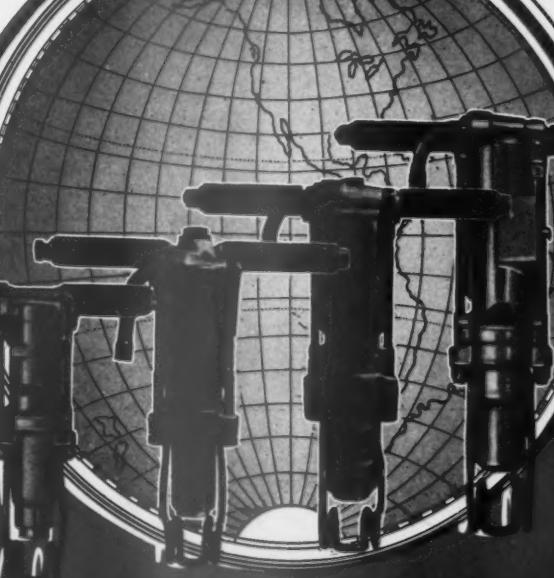
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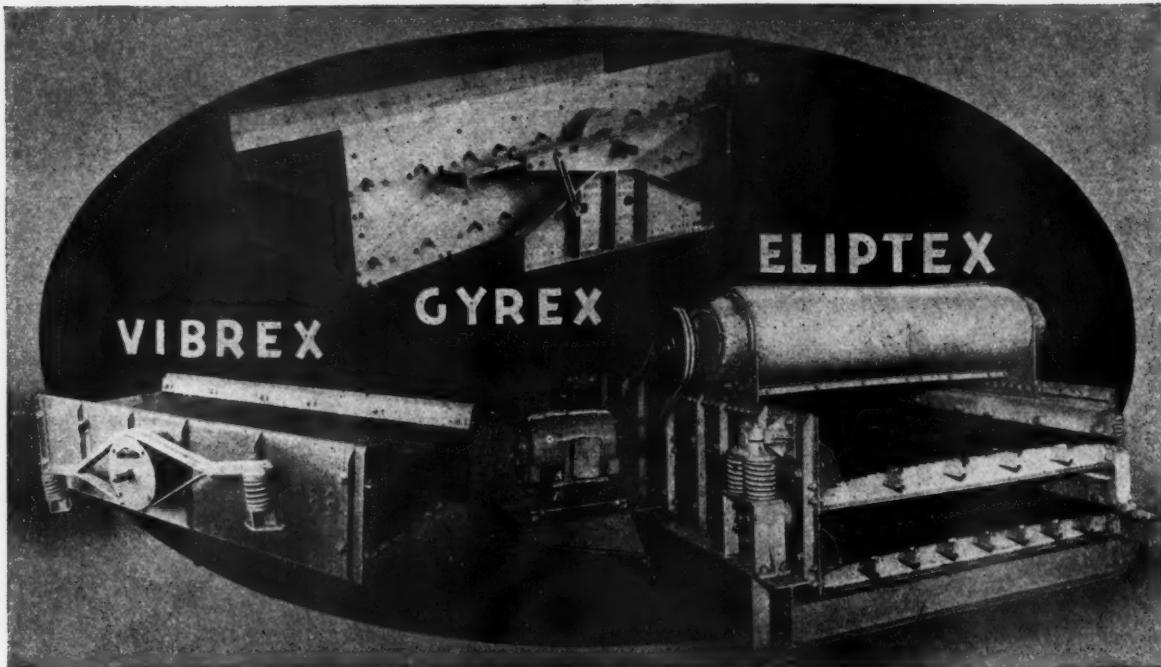
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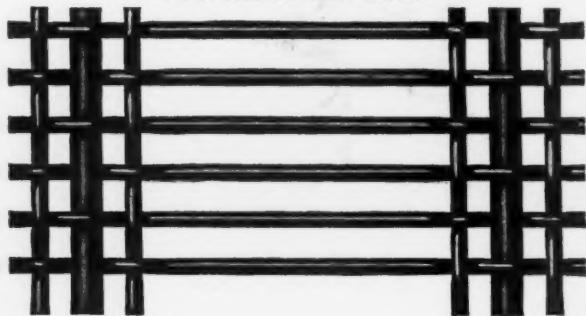


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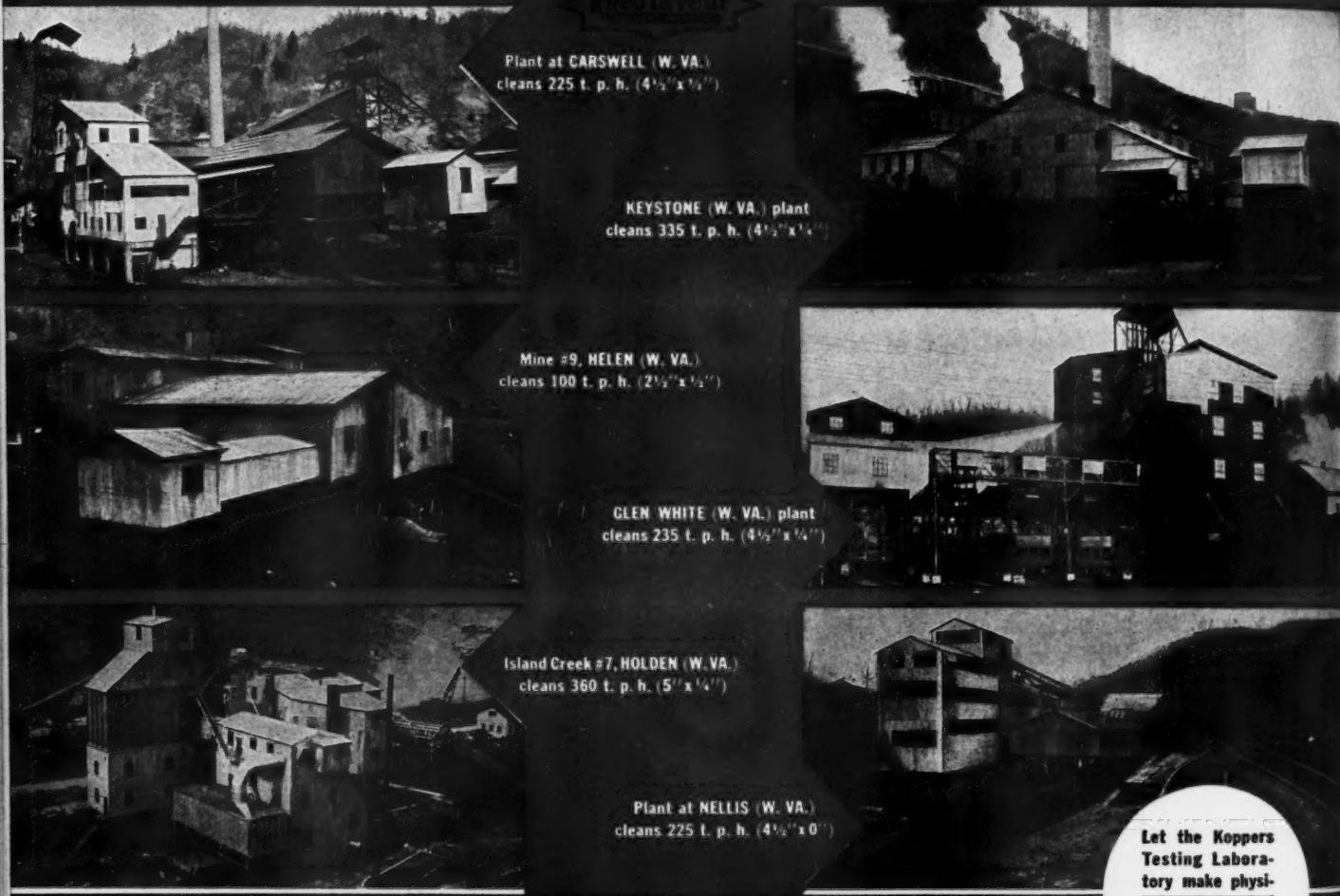
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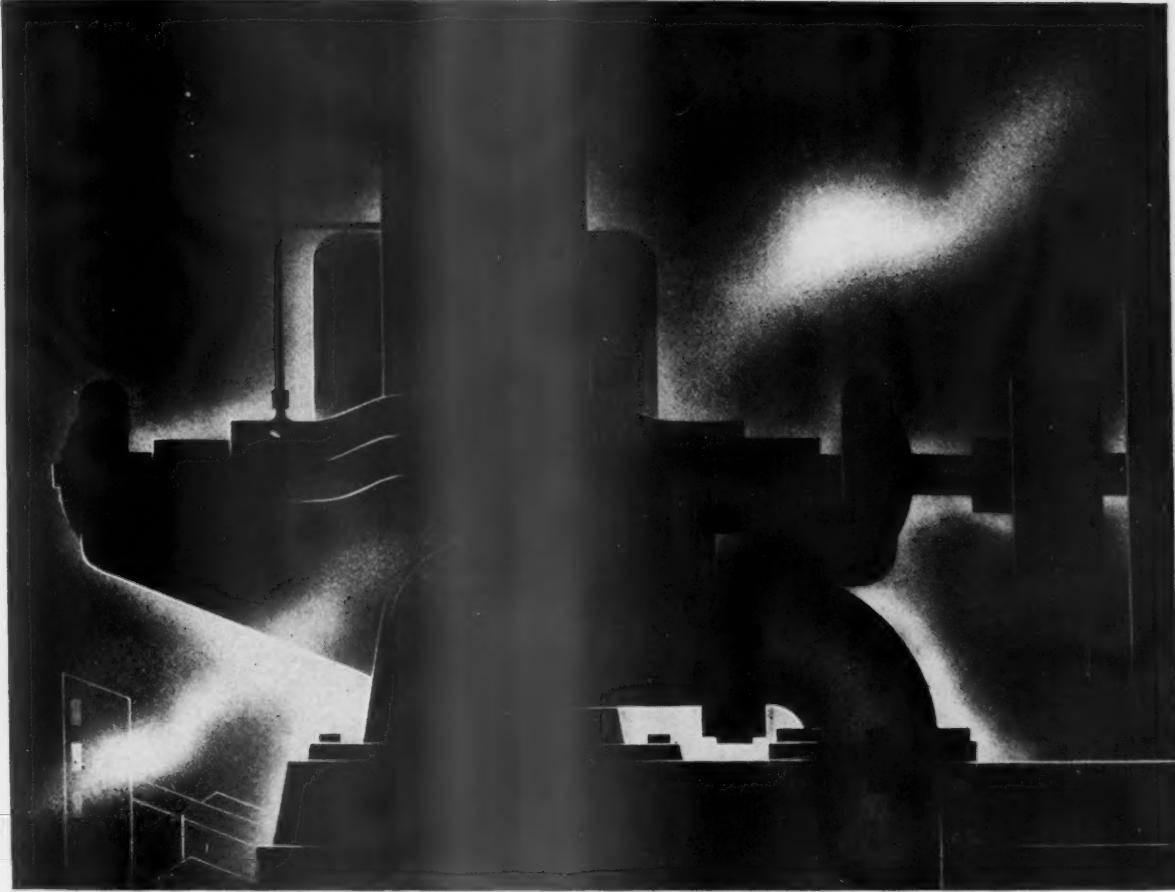
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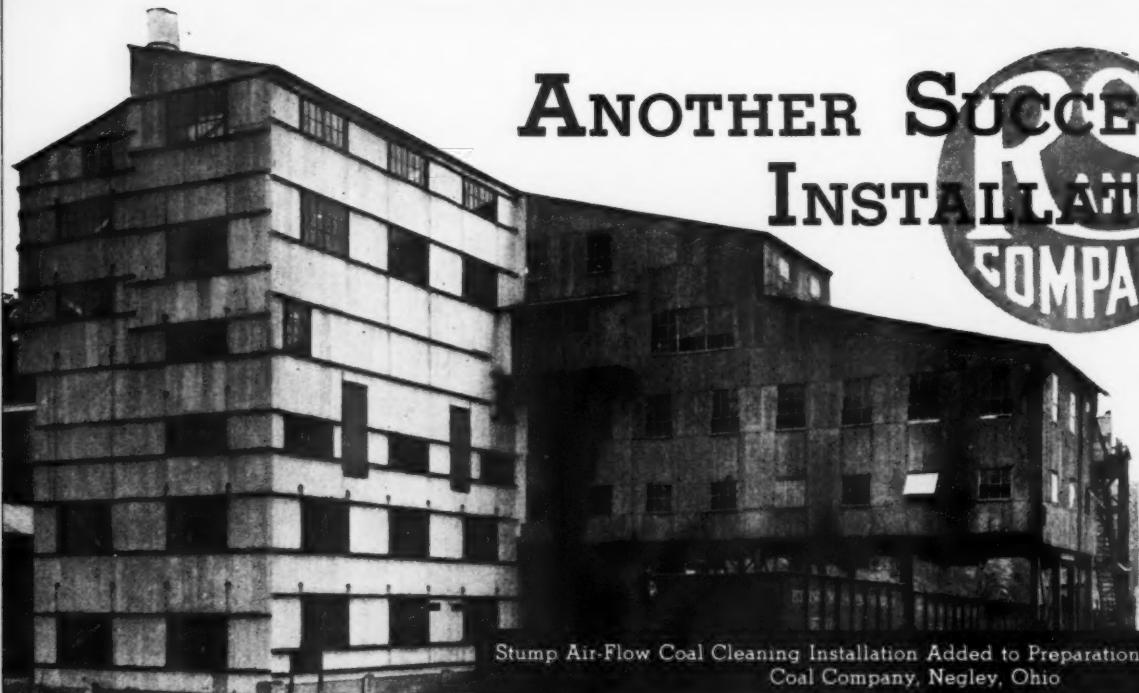
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SEPTEMBER, 1937

21



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The Price of Peace

"PEACE will remain an illusion unless nations like Japan can have freer access to raw materials and to pay for them in kind."

This statement was made before the Virginia Institute of Public Affairs by the New York correspondent of the *Japan Times and Mail*. It seems likewise to be the basis of thought held by a considerable number of Americans who base their war against protective tariffs upon the theory that to attain lasting peace we must lower tariff walls and thereby jeopardize the foundations of American prosperity.

Let us examine the fallacies of this logic.

First, we have no export tariffs, which are expressly forbidden by the following language in the Constitution: "No tax or duty shall be laid on articles exported from any state." The raw materials, therefore, are available to foreign buyers at prices comparable with those paid for similar goods by our own citizens.

To pay for them in kind implies importation into this country of either raw materials or manufactured goods of value equal to the exports.

Under a just system a duty must be paid on importation of such goods which represents the difference in cost of production as measured by the difference in wage levels here and abroad. This requirement seems reasonable, and surely is necessary if we are to maintain the living standards of the American workman.

For some four years a campaign has been pursued which includes a surrender—a trading away—of many import restrictions which were provided by Congress after full consideration of facts, in order to allow freer entry of certain classes of foreign merchandise.

A truly democratic government should allow each line of business, each section of the country, through its legal representatives, to be heard in deciding the policies which may make or break a business community. Though proponents may claim beneficial results therefrom, this trading away of the rights of industrial sections of the country, one at a time, would not be tolerated if all were being traded at the same time—and perhaps not at all if the public were aware in advance of the sacrifices being made, as it would be if Congress were not thus delegating its powers.

If in order to maintain peaceful relations with foreign countries the individual citizen must relinquish his property rights—assuming that deserved tariff protection may be so defined—then individual liberty is at an end. Only in the presence of dire necessity does the public right transcend the individual right of life or of property.

In European countries, where increasing populations seem to require expanded areas; in which expanded areas seem to its dictators to require increased fecundity in order that dictatorships shall be able to command an increasing soldiery for anticipated future wars; where the breeding of soldiers is the highest patriotic duty; where the urge to imperialism is everywhere prevalent; where fear is the determining influence of all national movements, theories of trade based on such procedure are directly and necessarily controlling.

In the United States, however, we need but to protect our higher standards of living, to deal fairly and without favoritism with all foreign nations, and as quickly as possible return to the simple, truly democratic principles on which our government was founded.

Extravagant government expenditures, lax enforcement of the laws, distrust of our courts, and a breaking down of the individual right to bargain—these are the real enemies, at home and not abroad, that call for continuing vigilance.



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Concerning Conventions

WITHIN A FORTNIGHT mining men from all parts of the country will assemble at Salt Lake City for the annual Metal Mining Convention and Exposition sponsored by the Western Division of the American Mining Congress.

To some this may give rise to the immediate query, "Why hold conventions?" or "Why spend valuable time and money to attend?"

Conventions constitute your best and in many cases your only means of meeting large numbers of representative men in your own business; of hearing mutual perplexing problems of wide scope presented and discussed by authorities; of renewing many old acquaintances and hobnobbing with them; and of lending your valuable aid in building up a strong, cohesive, representative body in your industry in order that united action may more effectively be taken in safeguarding your interests.

It will be very decidedly worth your while—educationally and vacationally—to attend the forthcoming meetings. Turn to page 31 to see what awaits you.

The Depletion Issue

"BECAUSE OF LACK of time, the committee has confined itself for the present to those subjects which may be directly classified under the head of evasion or avoidance, leaving out of account subjects such as community property or percentage depletion which will receive further consideration by the Joint Committee."

Such is the language in the report of August 5 with which the "Joint Committee on Tax Evasion and Avoidance" treats the proposal of the Secretary of the Treasury to eliminate percentage depletion. This committee is composed of men of long experience in making the revenue laws of this country. These men know that the income tax is not a tax on capital—they well know the limits of the taxing power of Congress under the Constitution and they have a full appreciation of the history and the record which stands out clearly in complete justification of the depletion deduction for the natural resource industries. The existing revenue laws pertaining to depletion represent the considered judgment of able members of Congress and of its experts over a period extending from 1909—nearly 30 years—and the effort has always been directed to simplicity

of administration and the minimizing of differences between the taxpayer and the Treasury officials. In this instance Congress should stand firmly on its sound past performance.

Hopeful Silicosis Research

THAT MINUTE QUANTITIES of finely powdered aluminum added to air containing a high concentration of silica dust may ultimately reduce silicosis hazards, is the welcome news coming from Toronto. Though the results, appearing in a recent issue of the *Canadian Medical Association Journal*, are not yet conclusive, the preliminary findings of scientists and physicians engaged in this research are decidedly promising.

The results in brief are as follows:

(1) Addition of small quantities of metallic aluminum dust almost completely inhibits the solubility of siliceous materials in a laboratory beaker.

(2) Rabbits dusted with quartz to which less than 1 percent aluminum dust had been added showed practically no fibrosis, while control rabbits, dusted with quartz alone, showed well developed fibrosis.

Backed technically and financially by a Canadian Nobel prize winner, Sir Frederick Banting, together with J. P. Bickell, president of the McIntyre Porcupine Mines, actual investigations were carried out by a metallurgist, a surgeon, and a research professor, all from Canada.

Should future developments prove its positive inhibitive action on humans, an additional practical advantage of aluminum is the fact that its specific gravity is only slightly less than quartz. Thus, when mixed with silica laden air it will remain in suspension fully as long as the quartz.

For years the mining industry has been vigorously pursuing methods of alleviating the silicosis hazard, and splendid results already have been obtained in many instances by improved ventilation, elimination of dry drilling, thorough soaking after blasting, and other precautionary measures.

To everyone interested in human welfare—and to the mining industry in particular—the additional progress exemplified by this news should be most welcome. Should future research result in successful application of this new and additional palliative, the medical world—indeed, in this case the mining industry can claim joint credit—will have made another great contribution to the cause of humanity.

Practical Difficulties Resulting from the SURTAX on UNDISTRIBUTED PROFITS[†]

ONE fundamental difficulty with a tax on undistributed profit is that the subject of the tax is so uncertain. We are not dealing with something real, definite or tangible. Sometimes in simple transactions we can identify particular dollars as representing gain, profits or income. Generally in business affairs we cannot do so, but must resort to theory and estimates, with much depending on who makes the estimates. We have not yet finished litigation under the 1917 Act, and have 20 years of subsequent legislation still to litigate. The Treasury is continually amending or revoking decisions it has previously made as to what constitutes taxable income. So we have the very real difficulty that no one knows just what it is that we are trying to tax.

Next, we have the difficulties of trying to write into law the provisions for taxing this unponderable, unreal and uncertain thing we call income, gain or profit. Grant that neither the Treasury nor Congress wishes to impose such a tax as will really hurt or retard business. Purely from a selfish standpoint, the Government cannot afford to dry up the very sources from which it hopes to derive its revenues. Directly or indirectly, government revenues come from business activity, business employment and business profits. I think we suffer not so much from a desire of those in our government to hamper and hurt as we do from their lack of understanding of the effect which the laws they enact, the rulings they make and the procedures they adopt will have upon business.

We do not always select for legislative or governmental positions those who best understand business conditions, operations and problems. So those who draft and pass our tax laws do not always have very clear conceptions of the problems to be dealt with in a tax law and naturally the law is not so well planned and phrased as we might wish it to be. Indefiniteness and uncertainties of concept are apt to be reflected in indefiniteness and uncertainties of language. There is much of this uncertainty in our undistributed profits tax law.

These uncertainties are not very serious if tax rates are low. Our 1 percent

* Loomis, Suffern & Fernald, New York City. Chairman, Executive Tax Committee, American Mining Congress.

† Presented before Round Table on the Surtax on Undistributed Corporate Earnings, Chamber of Commerce of the United States, Washington, D. C., April 27, 1937.

By HENRY B. FERNALD *

income tax rate of 1913 raised no great practical difficulties. Neither the Government nor the taxpayer was much concerned with exact determinations. If the taxpayer's accounts were honestly kept, with reasonable consistency, they were generally accepted. There was little dispute as to technicalities. Such disputes as arose could usually be settled on the broad principles of equity. Rarely were the amounts involved sufficient to merit extended contests. So in the pre-war years our income tax presented no very serious practical problems of administration or business effect. All this was changed when the wartime rates, running to 60 percent and 80 percent were imposed. The taxpayer could ignore the 1 percent tax in planning his business affairs. He could not afford to ignore the effect of a 60 percent or 80 percent tax rate, as many who did ignore it found to their sorrow. At the 1 percent rate, it was not very important whether the law was carefully and consistently drawn, whether Treasury regulations or an examiner's determinations were wholly correct, and neither the Bureau nor its employees were attempting to make fine distinctions; nor was there inducement for them to try to do so. With a 60 percent rate, it was vital that the law should be carefully phrased, interpreted and applied. The possible interpretation which might be placed on a word or a comma might mean a finding of additional income, of which 60 cents of every dollar would go to the Government. Many of us can remember the chaos which arose in trying to impose on income, which could not be determined exactly, high rates of tax to be fixed according to a theoretical definition of invested capital, which no one could measure and which had no relation to earning power. Only the wise administration of then—Commissioner Roper saved the Government from a complete breakdown of its revenue system, and only that administration and the ultimate repeal of the law prevented an almost complete paralysis of business.

In referring to this, I do not wish to enlarge the field of this discussion, but I do want to illustrate how much the

practical problems depend on the rate of tax. Each step upward in the scale of tax rates raises a new set of problems or magnifies the problems which might be ignored at a lower rate.

In our present law imposing a surtax on undistributed profits, there are these inherent defects: the subject of the tax is uncertain, the law imposing the tax is not clearly conceived and expressed, and the rates are high. So we have many practical problems.

1. *Net Income*—We have imposed a normal tax on a statutory net income somewhat arbitrarily defined. Having adopted this as a basis for the normal tax, it is likewise adopted as a basis for undistributed profits tax. Even though we say that the normal tax shall be imposed without taking into account capital losses suffered within the year, losses suffered in prior years and other disallowances or exclusions, it does not follow that this should be the basis for an undistributed profits tax. Unfairness under a 15 percent tax rate may become grievous injustice under an additional 27 percent rate. The mere matter of additional rate is important, wholly apart from the differences in principle of the law.

2. *Capital Losses*—A corporation with \$100,000 net income may have \$100,000 of capital net losses which it cannot deduct. Unless it has some prior surplus of earnings which it can distribute, it must pay the full undistributed profits tax on its \$100,000 net income. Even though it had a paid-in surplus or could create some form of capital surplus which under the State law it might distribute, it could not pay a "dividend" within the definition of Section 115 of the Act and so could not receive the dividend credit. For its misfortune in sustaining a capital loss, the business is subjected to a high tax.

3. *Gain on Retirement of Bonds*—Under existing rulings, the repurchase by a corporation of its bonds for less than their face value or issuing price gives rise to a taxable gain to be included in net income. Yet rarely will this be a gain which the corporation could distribute. Generally, the repur-

chase by a corporation of its securities at a discount is because it has been sustaining losses which will have served to wipe out any prior surplus and even create an impairment of its capital. The corporation with a deficit may barely break even on current operations but retire, in accord with sinking fund provisions, bonds it can repurchase at a discount. It has taxable income. It is bad enough for it to have to pay a normal tax thereon. It seems grossly unfair to require it to pay an additional undistributed profits tax on an amount which neither legally nor practically can it distribute to its stockholders.

4. *Deficits Due to Prior Losses*—The corporation which has continued its business with losses through the depression may show, in the current year, some income which only partly offsets its prior losses. Because of its deficit it cannot distribute this income to its stockholders unless it had a prior accumulation of earnings which would offset its losses in the depression. Many, if not most, businesses which have continued their operations through depression years have done so recognizing that they could not hope for current profits during the depression period. They have continued to operate because of their expectation that the profits of future years would offset their present losses. The losses thus sustained in keeping the business going, maintaining its organization, sustaining its employment, keeping up its relations with customers, may rightly be considered by the business man as part of the costs to him for profitable business of the future. Only on this basis is he justified in incurring them. We well recognize that in a seasonal business the costs and losses of the off-season are proper deductions from the profits of the busy season, so long as the two fall within a single year. We now refuse to recognize in our tax law that the operating loss of one year is actually part of the costs for profits of future years. Generally, we consider praiseworthy the organization which kept its business going through the depression even though it incurred losses which it hoped to make good out of future profits. Yet we have a tax law which imposes a heavy tax on the profits which that business cannot distribute because of the losses thus sustained.

A business, if such there be, that can count on a certainty of profit every year will not suffer from this. A business subject to fluctuations, with profits in some years and losses in others, is definitely imperiled. No sensible person looking for reasonable investment is going to put his money into a business which will have to distribute all profits without deduction for losses, or be subjected to a heavy tax on the amount of its losses, except where he sees an unusual opportunity of extraordinary profits. It would be entirely unsound finance.

What I have said as to the business which sustained losses during the depression, applies equally to the newly established business which must sustain

a period of loss before it can begin to make profits. I do not question the power of the Government to impose such a tax and to enforce it against those who may subject themselves to it. This it can do if it wishes, but it cannot—under our system of government at least—force the business man to place his investments in, or give his time, energy or abilities to a business, if this does not seem to him a reasonable or sensible thing for him to do.

I shall not take time to go into the mathematics of this, but I ask those of you who have not done so to take pencil and paper and make your computations of the result of a series of years of gains and losses. You will find the results of your computations are quite significant.

5. *Payments of Indebtedness*—Our law contains a provision giving limited recognition of the principle that earnings which must be applied in payment of indebtedness should not be subject to the

stock dividends is so shrouded in mystery that not even the Treasury Department itself will try to say just what are the taxable stock dividends which will give rise to a dividend paid credit. Nor is there any provision whereby the Treasury Department will determine in advance the amount of credit which might be allowed on any stock dividend even if it is determined to be a taxable dividend.

Do not misunderstand me. Sometimes the stock dividend does furnish relief. Sometimes the corporation may get relief through a dividend paid in notes. Sometimes the situation may be met by a recapitalization, but often these are not practicable remedies. In some cases contracts or agreements serve effectively to bar any of these measures. In other cases the corporation's credit standing would be ruined if it distributed a stock dividend or issued notes to its stockholders as a distribution to them of earnings which in fact had been applied to sinking fund redemption or other debt payments.

Even though the State law might permit payment of a stock dividend, and even though it might be a "taxable dividend," the market value of stock thus issued by a corporation subject to a heavy load of debt might be so low as to give no practical relief.

7. *Issuance of Notes for Dividend Purposes*—Generally, the issuing of notes for dividends is but postponing the evil day of reckoning. This is true whether the notes are issued as a dividend to stockholders or whether notes are issued to borrow cash which can be distributed as a cash dividend. They pile up a debt of the corporation for future payment. Unless the corporation can reasonably hope to sell stock to raise additional capital or unless it expects to reduce its assets so it may thus pay off its liabilities, it must count on future earnings to be applied to pay off the debt thus created.

8. *Responsibility of Directors as to Dividend Payments*—I am not an attorney and cannot attempt to speak of the actual liabilities which directors may incur for dividend payments. I can say that directors do not always have an easy decision to make, even with the best of legal advice, when they are faced with the alternative of paying the tax or distributing to stockholders funds which in their opinion are required for the proper conduct of the business of the corporation; or having the corporation incur liabilities which in their judgment it is not prudent for the corporation to incur.

Let me give a concrete illustration of the practical questions with which directors are faced in deciding whether they should distribute funds which they believe the corporation ought to retain for the reasonable needs of its business or whether, by failure to make such distribution, they will cause it to be obligated for a tax which in their opinion it should not be required to pay. (This is an illustration drawn from fact, simplified to bring out only a few of the



Henry B. Fernald

undistributed profits tax, but this is applied only to certain type of contracts so narrowly limited that few can obtain any benefit of this allowance. The practical situation may as effectively prevent the use of earnings for payment of dividends as would any particular type or form of contract. The bond indenture which requires a specific annual payment into the sinking fund may as effectively prevent the payment of dividends from earnings as if the indenture were such a contract as is specified in the law. The mere existence of indebtedness may in itself effectively preclude payment of a dividend.

6. *Stock Dividends*—It is urged that corporations which are unable to distribute cash could get their credit through payment of stock dividends. Yet this whole matter of taxability of

many points which had to be considered, and with amounts somewhat changed.)

In November, 1936, the directors had an estimate made of the corporation's probable income for the year and of its probable cash requirements. Income was estimated at \$300,000. The managers wanted the entire amount retained for actual business uses they wanted to make of the funds—some additional construction, machinery and equipment, an increase in quantity of inventories and increased costs of the materials, other increases in working capital and a sales campaign they wished to engage in. However, they had to recognize that the business did not make 27 percent profit on its goods and could not hope to make a profit equal to the tax on such funds retained in the business. So the directors pared down the estimates to the minimum of \$120,000 of the year's earnings which the corporation had to retain if it expected to keep its business going successfully.

Every business man will recognize that this was not a situation where the corporation had its \$300,000 of income for the year represented by a \$300,000 bank account from which it was proposed to take \$120,000 of cash as an additional fund for use in the business. The \$120,000 was an amount which, as the year progressed, had been used in the business. The question as it was faced in November became one of possible withdrawal of funds from business use without irreparable damage to the business—not one of investing additional funds for which the tax charge would be more than the expected profit.

So the directors figured on what dividends they could pay after meeting their tax liabilities, with a result as follows:

Net income	\$300,000.00
Normal tax	43,840.00
Adjusted net income....	\$256,160.00
Dividend paid	110,000.00
Undistributed net income.	\$146,160.00
Undistributed Profits tax:	
\$25,616 @ 7% =	\$1,793.12
25,616 @ 12% =	3,073.92
51,232 @ 17% =	8,709.44
43,696 @ 22% =	9,613.12
	\$23,189.60
Bal. remaining to corp...	\$122,970.40

The corporation thus had to pay an undistributed profits tax of \$23,000 to retain \$123,000 for the needs of its business. The tax was practically 18 percent of the amount retained, with considerable question whether the retention of that money would mean an 18 percent profit to the corporation. Actually, the board had left this matter until practically the end of the year. It then found itself in a jam where it could hardly effect retrenchments without serious damage to its business.

But this 18 percent was not the worst. There was \$43,696 of the undistributed net income on which the tax was \$9,613. In other words, there was \$34,000 of this amount which required payment of

\$9,613 tax to retain—a tax of practically 30 percent on the amount retained. The corporation could not hope to make 30 percent profit on funds employed in its business. It could not make this profit on goods purchased for its inventory, nor on money spent for machinery and equipment. Only the fact that the corporation could not curtail its present program without serious damage induced the directors to proceed under the necessity of paying this tax. I leave to you the question of whether those directors would intend to get in a similar jam at the end of next year. Perhaps they might be willing to pay a 7 percent tax for money to be used in the business, but we cannot expect them deliberately to head for a situation in which the tax cost would be more than the expected profit.

Perhaps there was some way in which a taxable stock dividend might have been paid, but the corporation only had one class of common stock outstanding. A dividend in common stock would not have been a taxable stock dividend. Perhaps a dividend in preferred stock would have given them a dividend paid credit, but no one seemed ready to give them assurance of that. An issue of notes or the borrowing of funds would only have deferred the evil days. I am not trying to say there was no possible relief they might have found. I am simply pointing out the problem they faced and the effect of their decision.

If a business does not spend the money for additional inventories, the suppliers of these materials lose that business and we must expect them in turn to make their curtailments. The machinery and equipment manufacturers who lose their sales will, in turn, curtail on their purchases and their labor expenditures. The abandonment of a selling campaign means that some people will not be employed and other expenditures will not be made. There is definite pressure here against the expansion and development of business and employment.

There is another point to be noted. We seem to be in a period of increasing cost and increasing prices. Suppose the inventories of a business are \$500,000. If prices go up 10 percent the same quantity of goods will call for \$50,000 more tied up in inventory. If the additional \$50,000 is not available, the alternative would be to reduce the quantity of goods in inventory to keep it within the amount available. If the tax rate is higher than the expected margin of profit from handling the goods, or is a substantial percentage of that profit, we must expect curtailment which means reduction in volume of purchases, in volume of labor and in other expenditures, and also presumably in the amount of future profits, and in curtailing of governmental revenues all along the line.

As to some of these problems we can brush aside any thought by the government as to the welfare of taxpayers and their interests, except as the government may have its own selfish interest in them for the revenues it may draw from them and their efforts. If and to the extent

that the government makes business transactions unprofitable, it loses the revenues which might come from them. Temporarily, the government may gain because it takes time for taxpayers to understand the new tax and to adjust their affairs to it, but the temporary gain in government revenues may be more than offset by the long-time loss.

It is an easy thing to write tax laws which on paper will show immense revenues to accrue to the government, but "the power to tax involves the power to destroy." If the tax imposed leaves no incentive to the taxpayers to engage in business, there will not be the profits to be taxed and the government will not receive its revenues. We do not need to go to the point where taxes become more than the amount of expected profits. If the tax seriously threatens the business profits or is an obstruction to the ready conduct of business, or even if it merely serves as an element of worry and disturbance, it may serve to curtail the revenues.

It is fundamental in business to make it as easy as possible for customers to purchase goods. The merchant, to increase his sales, does not try to place impediments in the way of his customers. Something of this thought might well find its way into our plans for taxation and government revenues.

Again, I may turn to business and point out that the merchant who wants to increase his sales and the volume of his business, does not do so by raising his prices to a point where there will be no inducement to his customers to purchase. It is not generally the highest priced goods that yield the largest profits. This, then, is a basic difficulty with our undistributed profits tax. It hampers and obstructs the flow of business from which large government revenues are expected to come. It tries to raise at high rates an amount of revenue which could only be expected to come from a large volume of business taxed at more reasonable rates.

There are many other practical difficulties which might be mentioned and which I hope will be mentioned, some of them perhaps even more important than those to which I have referred. But there is one concluding point I want to bring out.

9. *The Administrative Standpoint*—Brush aside the taxpayer's standpoint. Forget about the effect of the tax on business. Look solely at the problem of how such a law can possibly be administered.

We have an exceedingly complicated law. Yet it must be interpreted and applied by thousands of Treasury Department examiners and auditors to an infinite variety of business organizations and transactions. Can the Department hope to instruct and train the members of such a force so that they can properly discharge their duties?

The future will tell this, but to my mind this is one of the greatest practical problems we face when we try under an involved, complicated law to tax, at high rates, the concept of income or profits.



WITH members of both Houses of Congress pressing for adjournment, the election of Senator Alben Barkley, of Kentucky, as majority floor leader of the Senate was followed by quick action on the President's Supreme Court bill. Motion to recommit the measure to the Senate Judiciary Committee was adopted by a vote of 70 to 20, with the understanding that the committee would develop a compromise bill. The committee acted by taking H. R. 2260, by Hattan Sumners, of Texas, chairman of the House Judiciary Committee, which had been passed by the House April 7, and slightly changing its form. The bill as reported would permit the government to be represented in any case where the constitutionality of an Act of Congress is involved and would require a three-judge court to rule in such a case. No specific number of lower court judges is set forth in the bill, but the Attorney General is to make a survey and recommend appointments as required. The bill was called up and quickly passed by the Senate on August 7 without a record vote under the "steam roller" guidance of Vice President Garner. House concurrence was rapid and the bill is now before the President for approval.

Wheels of Government

As viewed by A. W. Dickinson of the American Mining Congress

LABOR STANDARDS BILL

Better known as the Black-Connery wage and hour bill, this measure has caused great concern to the mining industry in the past month. As passed by the Senate at 5 o'clock on Saturday afternoon, July 31, it was amply loaded with amendments exempting agricultural processing. General standards were fixed at 40c per hour, with the maximum work-week at 40 hours. The labor of children under 16 was prohibited, with the age limit set at 18 for hazardous industries.

In the House Committee on Labor, the bill was the subject of a prolonged struggle. Southern Democrats saw in its provisions a threat to the wage differentials which permit the industries of the South to compete in distant market areas which require heavy transportation costs. The labor organizations, which have been cool toward the bill, saw in its provisions elements that they considered harmful to collective bargaining. After a call at the White House, President William Green of the American Federation of Labor rushed to the Labor

Committee with amendments which he considered vital to the interests which he represents. Accordingly, the committee wrote into the bill that labor standard orders establishing minimum wages or a maximum work-week are to be made only if the board finds that collective-bargaining agreements do not cover a substantial proportion of the employees, or that existing facilities for collective bargaining are inadequate or ineffective. Subject to the 40c maximum and the 40-hour minimum, wages established by the board are not to be lower, nor hours longer, than the prevailing wages and hours in the locality for similar work. Collective-bargaining agreements in any industry are to be *prima facie* evidence of appropriate minimum wages and maximum hours to be established by the board.

Of more serious concern to mining was the amendment introduced by Representative Ramspeck (Dem., Ga.), which was primarily intended to discourage overproduction in textile mills. The amendment provided that between the hours of midnight and 6 a. m., in "those industries or occupations which do not require continuous process operation," persons employed shall be paid a rate of not less than one and one-half times the rate otherwise established by the board. As written, this provision would have seriously interfered with long-established night-shift customs in the mining industry, which are essential to economy of operation and the efficient use of existing capacities. The work of maintenance men and the progress of shaft-sinking, drifting, and other forms of development would likewise have been seriously hampered. When the mineral producers of the country were informed of the nature of this so-called "graveyard shift" amendment, they protested so vigorously that a number of representatives in Congress from western mining states and elsewhere held a special meeting and thereafter made a united protest to Chairman Mary Norton (Dem., N. J.) of the House Labor Committee. The full text of this protest may be found on the following page. As a result, the committee, after having reported the bill to the House, met and agreed to accept a committee amendment from the floor, striking out the "graveyard shift" feature.

The latest word concerning the wage-hour bill is that its proponents have announced that they see no possibility of securing a rule for floor consideration from the House Committee on Rules. It is reported that the vote in Rules Committee stands 9 to 5 against the bill. Representative Arthur D. Healey (Dem., Mass.), who is the chairman of an informal "Wages-Hours Steering Committee," made up of 25 proponents of wage and hour legislation, has announced that he will be satisfied to let the bill die now on two conditions:

- (1) That a recess-study committee be appointed to survey the entire situation until Congress meets in January, and

- (2) That "positive assurance" be given that wage-hour legislation will be proposed for enactment early next session.

He further stated: "I believe that in this way we would get a stronger bill than they now have in the House. Further, passage of the present bill without certain amendments might be disastrous."

STREAM POLLUTION

For many weeks there have been occasional rumors that Senator Lonergan (Dem., Conn.) and Senator Barkley (Dem., Ky.) were negotiating a compromise between the Lonergan Stream Pollution Bill (S. 13) and the already House-approved Vinson Stream Pollution Bill (H. R. 2711). Recently these negotiations suddenly climaxed in the introduction of an amended bill bearing the same number and in the nature of a substitute for the Vinson bill (H. R. 2711). As amended, there have been incorporated in the measure five provisions of the Lonergan bill, S. 13, certain of which are considered very harmful to mining. These include:

Sec. 2(c)—Sec. 4 of S. 13—which grants consent of Congress to two or more states entering into agreements and compacts on stream pollution;

Sec. 7(b) and (c)—Secs. 6(a) and (b) of S. 13—directing the (stream pollution) board to classify the navigable waters of the United States into districts and to fix standards of purity for each such district;

Sec. 8—Sec. 9 of S. 13—declaring the discharge of waste into navigable waters or tributaries to be against the public policy of the United States and to be a public and common nuisance, and providing for court actions to abate or prevent pollution as a public nuisance, after the expiration of three years from the date of enactment;

Sec. 9—Sec. 10 of S. 13—which would permit anyone affected to bring damage actions on account of pollution of waters.

It is believed that the amended bill will be passed by the Senate in the midst of the adjournment rush and that it will then be subject to the action of a conference committee. It is difficult to believe that the House conferees will accept the drastic Lonergan amendments. When the Vinson bill was under consideration in the House, the drastic Pfeifer bill was also before the Committee on Rivers and Harbors, and only after prolonged hearings and careful consideration on the part of the committee was the more moderate Vinson planning and survey bill approved. The House conferees are expected to stand firmly on their considered position against drastic legislation which would work great harm to industrial enterprise.

TAX "LOOHOLE PLUGGING"

On Friday, August 13, the Committee on Ways and Means reported the result

of the work of the Joint Committee on Tax Evasion and Avoidance in the form of a bill, highly technical in nature, designed to "plug loopholes" whereby wealthy individuals are alleged to have avoided certain tax payments. In the main, the bill treats the matter of domestic and foreign personal holding companies. Surtax rates are set at 75 percent of the undistributed adjusted net income in excess of \$2,000. The bill contains much detail concerning stock ownerships, and treats the subjects of trusts, mutual investment companies, and non-resident alien individuals.

The subjects of percentage depletion and community property were not considered in the writing of the bill and will not be the subject of treatment in the present session of Congress. The bill as introduced is so complicated that it can not be understood by the majority of the membership of the Congress, and with the approval of the Committee on Ways and Means and the Committee on Finance, it will be quickly passed by both Houses.

NATIONAL BITUMINOUS COAL COMMISSION

Hearings have been in progress both in Washington and in other central cities of coal-producing areas, in the course of the commission's work in establishing marketing rules and regulations. The subject of classification of coals upon which price fixing will be based is being treated through hearings and conferences by the commission and by each of the 23 district boards. Every effort is being made toward the authorizing of prices early in October.

A series of hearings, extending to September 15, is being held to consider the applications of "captive mines" for exemption from the Bituminous Coal Code. Subsection (L) of the code in the statute contains the following:

"The provisions of this section shall not apply to coal consumed by the producer or to coal transported by the producer to himself for consumption by him."

The question has been raised as to whether the language of the statute permits exemption from the code when title of the coal passes from one corporate entity to another, even though one be wholly or partially owned by the other. Many people feel that "captive production" should be excluded from the code for the reason that such production can hardly be included in the computations of weighted average costs upon which prices are to be based.

The commission has a tremendous task before it and the situation is complicated by the necessity for building up a working staff in a short period of time. Fortunately, the commission has the services of Dr. F. G. Tryon's trained personnel from the Bureau of Mines (now included in the commission's staff) for the conduct of its statistical work.

+ + +

Statement of Mining Congressmen to House Committee on Labor Opposing Graveyard Shift Features of Wage-Hour Bill.

+ + +

In behalf of our mining constituents in the Western States, we wish to urge the elimination of the House Labor Committee amendment to S. 2475, appearing on page 16, lines 7 to 18 of the Committee print of August 5, 1937, for the following reasons:

- (1) It would interfere with long established practices which are necessary for efficiency and economy in the production of our mineral resources.
- (2) It would result in unbearable increases in production costs.
- (3) It would restrict production badly needed at the present time.
- (4) It would increase unemployment.
- (5) It would interfere seriously with necessary precautions for the safety and health of the workmen.

The amendment would compel the payment of one and one-half times the established wage between the hours of midnight and 6 a. m., in those industries or occupations which do not require continuous process operation. By its terms it would thus prevent the long established practice of night-shift operation in mines and in certain treatment plants.

The production of mineral from our mines in quantities sufficient to meet market demands requires the performance of night-shift work. The shifts are rotated by established custom, so that workmen are employed two weeks night-shift and two weeks day-shift, thereby disproving any grounds for the charge that night-shift employment is harmful to health. It is essential to conduct operations so that a period of four hours elapses between the time of blasting performed at the end of each shift and the time when the next shift enters the mine. This is for the definite purpose of permitting powder fumes and dust created by the blasting to be removed from the mines by the ventilating system, thereby safeguarding the health of the workmen.

With the large investments required in developing and equipping a mineral producing property, it is imperative that production be kept at full capacity in times when there is a demand for the product. The prohibitive costs imposed by compelling payment of a 50 percent increase in the wage rate would cut the operation of mines to one shift. It is inconceivable that Congress should so legislate that many millions of dollars worth of development and equipment must stand idle for two-thirds of each 24-hour day. This is uneconomic and unsound.

Elimination of the night-shift and consequently curtailment of production by arbitrary edict would inevitably increase

production costs. The wages of miners in the United States are by far the highest in the world. However, the prices of mineral products are established not in our domestic markets, but in the markets of the world and our mines and our workmen are compelled to compete with the low wage labor of foreign countries. It is only by the most careful practice of efficiency and the resourcefulness of our American managers, engineers and workmen, that our mines are able to maintain our high standards of wages and still meet foreign competition.

The restriction of production brought about by the elimination of the night-shift would come at a most unfortunate time. Our mineral producers today are straining every effort to supply the demand for their products. It is simply impossible to take the workmen who are now employed on both day and night-shifts and place them all in day-shift employment. There are no mineral properties where the physical conditions of the shafts, drifts and various underground chambers will permit of the employment of double the number of men now working. Most frequently of all, the shaft and the hoisting equipment are taxed to capacity to bring out the mineral produced on each shift.

Serious unemployment would be the immediate result of the enactment of this amendment which would eliminate the night-shift. Through the enterprise of the mineral producers of this country, many thousands of men have been put to work in the past three years. Many of these men are employed in the development or in the operation of properties where the mineral content is small or where the cost of recovery is nearly equal to the realization from the sale of the product. An arbitrary increase of one and one-half times the wage paid on the night-shift is simply impossible for these properties. Under such circumstances they must shut down.

It might be argued that the day-shift could go to work in the mine at 8 a. m., and work until 4 p. m., and the night-shift might start work immediately thereafter and cease work at 12 midnight. This proposal while theoretically possible, disregards the necessity for a period of four hours between the time of blasting at the close of each shift and the time when the next shift enters the mine to work. Blasting creates noxious fumes and liberates dust. The ventilating system of the mine must be permitted to clear the fumes and the dust for four hours after blasting in order to protect the safety and health of the workmen and this has long been recognized and recommended by the United

States Bureau of Mines and our own state mining authorities. It would be extremely dangerous to rush into a working face immediately after it has been blasted down. In addition to the noxious fumes and the dust, there is the danger of a hung shot. There is also the very real danger of injury or death from falls of rock loosened by the blasting. After the lapse of four hours a mine workman can approach the face under conditions of good air, good visibility, and with the exercise of the proper precaution necessary to the safety of himself and his fellow workmen.

The proposed Committee amendment to require time and one-half for night work would cripple our mining industries and result in serious unemployment, and we respectfully urge its elimination.

New Uses for Silver Sought

Several years ago a group of eight of the principal American silver interests financed a survey covering the industrial possibilities of silver, believing a substantial industrial cushion would steady the market in times of stress, according to a recent statement by Dr. Lyman J. Briggs, director, National Bureau of Standards.

Silver had had but slight consideration as a raw material, Dr. Briggs points out. Two research associateships at the National Bureau of Standards were established and the results were incorporated in condensed form in the Bureau's circular on silver (C412).

Virtually the same sponsors have now established a group of 15 fellowships at nine institutions to explore the leads established by the previous survey. The Bureau of Standards has been made the center of the plan, three men being assigned to physical and metallurgical research there, at the same time concentrating the foundry and assay work.

Each of these fellows has been assigned a definite problem the successful solution of which will materially increase the consumption of silver, and the results are being noted in brief weekly reports to the Bureau of Standards. Periodically, condensed progress reports are made up and sent to the principal research laboratories and interested industries. Patents are outlawed and thumbnail sketches of work done are published in the monthly *Technical News Bulletin* of the Bureau in order.

As soon as anything appears which seems likely to have commercial value, contact is established with the principal manufacturing interests in that particular line. They are given full information and invited to make use of it. In dealing with a raw material, such methods, he declared, are feasible as no matter from whom the silver used may be obtained the silver market is strengthened.

Interesting preliminary results are already being reached in several widely separated fields, and if successful in a large way, the outcome will probably be that others will apply the method to a number of similar problems.



Howard I. Young
President of the American Zinc, Lead and
Smelting Co.

Mr. Young is President of the American Mining
Congress.

The Salt Lake City September meeting of the Metal Division of the American Mining Congress offers to every one interested in mining an excellent opportunity to hear and participate in a program devoted entirely to mining subjects—both from a local and from a national standpoint—and, at the same time, will afford unusual opportunities to see the latest developments in mine equipment, and to visit large, modern mining, milling, and smelting operations.

All business is confronted with new problems, which makes it very important that executives in any industry frankly exchange ideas. Such an exchange is beneficial to all and assists in developing a constructive program for the industry.

MECCA OF COAL OPERATORS



Oscar N. Friendly

Vice President, Park Utah Consolidated Mines Co.

Mr. Friendly is Chairman of the Western Division.

The coming Convention at Salt Lake City of the Western Division of the Congress, will be an opportunity for those interested in the production of metals to get together and discuss matters which concern the welfare of the industry. There is too little realization among the rank and file of the people of this country of the importance to economic welfare of the pouring of metallic wealth into the business stream. They should be taught the difference between a "bank clearance dollar" and a dollar of new metallic wealth. The Convention will bring together those who have the responsibility of producing metals so that they may know each other and make common plans to meet the fast developing new conditions which face the industry. Those who come will find their stay in Salt Lake City pleasant, the Exposition instructive, and the opportunity to meet old friends and to make new ones a privilege.



Guy N. Bjorge
General Manager, Homestake Mining Co.

Mr. Bjorge is National Chairman of the
Program Committee

The "mining industry" is one of our two major basic industries. About one-fourth of our population is directly or indirectly dependent on it for their livelihood. Its products furnish more than half the revenue freight for the railroads. It pays enormous amounts in taxes toward the support of local, state and federal governments.

The Metal Mining Convention of the American Mining Congress represents a large part of this industry. It includes a series of industries, each of major importance, each with its peculiar problems. These industries need a common meeting point for the discussion of their common problems. With present conditions, the wholehearted cooperation of all branches of the industry is essential. Further than this, it is important that we cooperate with all other industries for constructive action on the problems that confront us.



At the American Mining Congress meeting to be held at Salt Lake City, September 7 to 10, Utah will be host to many of the most prominent mining men of the country. Problems pertaining to every phase of mining and metallurgy will be discussed by experts. There will be entertainment, and opportunity for fraternizing with friends in your profession. Therefore it will be to your personal advantage to attend this convention, and assist in making it the success that we expect it to be.

W. J. O'Connor

Manager, American Smelting & Refining Co.

Mr. O'Connor is Chairman of the General Committee on Arrangements.

W. J. O'Connor



The
**METAL MINING
CONVENTION
and
EXPOSITION**

"THIS is the place." With these welcome words Brigham Young informed his small band of hardy pioneers, as they gazed upon beautiful Salt Lake Valley in 1847, that their long weary trek was over. The phrase applies with equal emphasis in September, 1937, 90 years later; for on the 7th to 12th of this month Salt Lake City, which has since grown into the metropolis of the "Intermountain Empire", will be host to metal mining men from all parts of the United States.

Sponsored by the Western Division of the American Mining Congress of which O. N. Friendly is present chairman, the annual Metal Mining Convention and Exposition is held in the fall every year, and brings together mine executives and operating men from all corners of the country for mutual discussion of economic and operating problems of vital interest to the metal mining industry, together with a large and representative group of equipment and supply manufacturers for display of their products. In the past three years the meeting



Donald A. Callahan



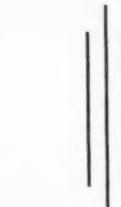
James R. Hobbins



Arthur E. Bendelari



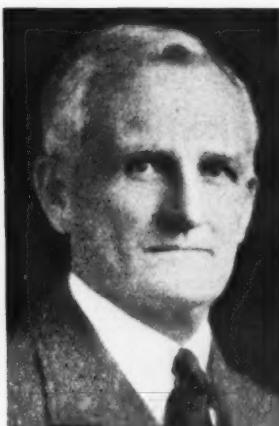
Edward B. Greene



Representatives of
the Metal Mining
Industry on the
Board of Directors
The American Mining Congress



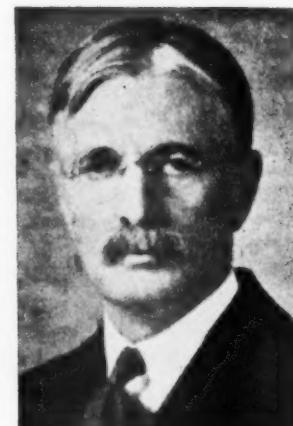
David D. Moffat



Donald B. Gillies



Charles H. Segerstrom



Clinton H. Crane

point has been shifted successively to localities situated farther to the west, until in 1937 it has reached almost the exact geographic center of western mining activities. Salt Lake City is probably the most convenient point for such a meeting that could have been chosen.

The complete list of the Board of Governors of the Western Division of the American Mining Congress comprises the following:

ALASKA

Roy Earling, Fairbanks Exploration Co., Fairbanks, Alaska.
P. R. Bradley, Pres., Alaska Juneau Mining Co., San Francisco, Calif.

ARIZONA

P. G. Beckett, Vice Pres. and Gen. Mgr., Phelps Dodge Corp., Douglas.
T. H. O'Brien, Gen. Mgr., Inspiration Cons. Copper Co., Inspiration.
Ex-Oficio—R. W. Thomas, Governor, Arizona Chapter, A. M. C., Superior.

CALIFORNIA

Thomas McCormack, Pres., Natomas Dredging Co., Sacramento.
Wm. Simkins, Newmont Mining Co., San Francisco.
Julian Boyd, Pacific Coast Borax Co., 510 W. Sixth St., Los Angeles.

COLORADO

Charles A. Chase, Shenandoah-Dives Mining Co., Silverton.
George H. Rupp, Mgr., Mining Dept., Colorado Fuel & Iron Co., Pueblo.
Ex-Oficio—Robt. S. Palmer, Secy., Colorado Chapter, A. M. C., Denver.

IDAHO

L. E. Hanley, Vice Pres., Hecla Mining Co., Wallace.
Arthur Campbell, State Mine Inspector, Boise.
Ex-Oficio—J. W. Gwinn, Secy., Idaho Mining Assn., Boise.

MONTANA

W. B. Daly, Mgr. Mines, Anaconda Copper Mining Co., Butte.
J. D. Mackenzie, Mgr., East Helena Plant, American Smelting & Refining Co., East Helena.
Ex-Oficio—Carl J. Trauerman, Pres., Montana Mining Assn., Butte.

NEVADA

H. A. Johnson, Gen. Supt., Tonopah Mining Co., Tonopah.
J. C. Kinnear, Gen. Mgr., Nevada Cons. Copper Corp., McGill.
Ex-Oficio—Henry S. Rives, Secy., Nevada Mine Operators Assn., Reno.

NEW MEXICO

K. B. Tempest, Gen. Mgr., Nevada Cons. Copper Corp., Hurley.
Ira L. Wright, Gen. Mgr., Black Hawk Cons. Mines Co., Silver City.
Ex-Oficio—J. F. Woodbury, Secy., New Mexico Chapter, A. M. C., Silver City.

OKLAHOMA

Geo. W. Potter, Vice Pres., Eagle Picher Mining & Smelting Co., Picher.



A. G. MACKENZIE
Secretary, Utah Chapter, American Mining Congress
Host to the Convention

J. A. Robinson, Gen. Mgr., Commerce Mining & Royalty Co., Miami.
Ex-Oficio—Evan Just, Secy., Tri-State Zinc & Lead Ore Producers Assn., Miami.

SOUTH DAKOTA

Guy N. Bjorge, Gen. Mgr., Homestake Mining Co., Lead.

TEXAS

Brent N. Rickard, Mgr., El Paso Smelting Works, American Smelting & Refining Co., El Paso.
H. F. Treichler, Gen. Mgr., Texas Gulf Sulphur Co., Newgulf.

UTAH

E. A. Hamilton, Manager of Mines, United States Smelting, Refining & Mining Co., Salt Lake City.
W. Mont Ferry, Vice Pres., Silver King Coalition Mines Co., Salt Lake City.
Ex-Oficio—A. G. Mackenzie, Secy., Utah Chapter, A. M. C., Salt Lake City.

WASHINGTON

Lewis P. Larsen, Pres., Pend Oreille Mines and Metals Co., Old Natl. Bank Bldg., Spokane.
Dean Milnor Roberts, Professor, Mining and Metallurgy, University of Washington, Seattle.

For many months the Program Committee, under the chairmanship of Guy

N. Bjorge, general manager, Homestake Mining Company, has been actively engaged in working up a splendid list of subjects to be presented by authoritative leaders in their respective fields. Great care was exercised in selecting the relatively few topics from the hundreds of suggestions which were made by members of the entire committee, with only those of the greatest current interest being finally chosen.

Serving under Mr. Bjorge are the following 96 members of the Program Committee, listed according to the different state and district subcommittees:

ARIZONA

Chairman: Wm. Koerner, Gen. Mgr., Magma Copper Co., Superior.
P. G. Beckett, Vice Pres., Phelps Dodge Corp., Douglas.
T. H. O'Brien, Gen. Mgr., Inspiration Cons. Copper Co., Inspiration.
Robt. W. Thomas, Gen. Mgr., Nevada Cons. Copper Corp., Ray.
Chas. F. Willis, Editor, *The Mining Journal*, Phoenix.

CALIFORNIA

Chairman: Robert Linton, Cons. Engr., Los Angeles.
Julian Boyd, Mining Association of the Southwest, Los Angeles.
G. Chester Brown, Secy.-Treas., California Metal & Mineral Producers Assn., San Francisco.

State Chairmen



C. Merrill Chapin



J. C. Kinnear

Albert F. Knorp, Gold Producers of California, San Francisco.

Thomas McCormack, Pres., Natomas Dredging Co., Sacramento.

F. C. van Deinse, Vice Pres., Yuba Consolidated Gold Fields, San Francisco.

COLORADO

Chairman: Max Bowen, Mgr., Golden Cycle Corp., Colorado Springs.

Robert H. Sayre, Veta Mines, Inc., Denver.

F. D. Willoughby, Pres. and Gen. Mgr., Midnight Mining Co., Aspen.

J. G. Clark, Gold, Silver & Tungsten, Inc., Boulder.

J. Price Briscoe, Fairplay Gold Mines, Fairplay.

E. D. Dickerman, Star Mines, Leadville.

Robert S. Palmer, Secy., Colorado Chapter, American Mining Congress, Denver.

IDAHO

Chairman: Ross D. Leisk, Gen. Mgr., Sunshine Mining Co., Kellogg.

J. E. Berg, Federal Mining & Smelting Co., Wallace.

D. A. Callahan, Wallace.

Henry L. Day, Asst. Mgr., Hercules Mining Co., Wallace.

Stanly A. Easton, Pres., Bunker Hill & Sullivan Mining & Conc. Co., Kellogg.

James B. Eldridge, Pres.-Gen. Mgr., Mayflower Gold Mines, Inc., Boise.

J. W. Gwinn, Secy., Idaho Mining Association, Boise.

J. F. McCarthy, Pres., Hecla Mining Co., Wallace.

E. M. Norris, Supt., Fertilizer Dept., Anaconda Copper Mining Co., Conda.

LAKE SUPERIOR DISTRICT

Chairman: M. C. Lake, Cons. Geologist, M. A. Hanna Co., Duluth, Minn.

S. R. Elliott, Gen. Mgr., The Cleveland Cliffs Iron Co., Ishpeming, Mich.

M. D. Harbaugh, Vice Pres., The Lake Superior Iron Ore Assn., Cleveland, Ohio.

John E. Nelson, Mgr., Republic Steel Corp., Duluth, Minn.

Clarence B. Randall, Vice Pres., Inland Steel Co., Chicago, Ill.

Oliver M. Schaus, Gen. Supt., Montreal Mining Co., Montreal, Wis.

J. Wilbur Van Evera, Mgr., Gordon Mining Co., Crosby, Minn.



M. C. Lake



H. S. Salmon



J. T. Matson



J. D. Mackenzie



Milnor Roberts

Carl Zapffe, Mgr., Iron Ore Properties,
Northern Pacific Railway Co., Brainerd, Minn.

MISSISSIPPI VALLEY DISTRICT

Chairman: J. A. Caselton, 2nd Vice Pres. and Secy., St. Louis Smelting & Refg. Co., St. Louis, Mo.
L. T. Sicka, Gen. Mgr., St. Joseph Lead Co., Bonne Terre, Mo.
E. R. Shorey, Assoc. Prof. Mng. & Met., University of Wisconsin, Madison.
A. C. Callen, Head, Dept. Mng. & Metallurgical Engrg., Univ. of Illinois, Urbana.

MONTANA

Chairman: J. D. MacKenzie, Mgr., East Helena Plant, America Smelting & Refg. Co., East Helena.
Harry Bacorn, Jardine, Mont.
J. J. Carrigan, Asst. Gen. Supt. of Mines, Anaconda Copper Mining Co., Butte.
W. G. Ferguson, Montanans, Inc., Helena.
F. C. Gilbert, Secy., Montana Mining Assn., Butte.
Dr. Francis A. Thomson, Pres., Montana School of Mines, Butte.

NEVADA

Chairman: J. C. Kinnear, Gen. Mgr., Nevada Cons. Copper Corp., McGill.

W. H. Blackburn, Tybo, Nye County.
L. D. Gordon, Gen. Mgr., Penelas Mining Co., Fallon.
H. A. Johnson, Gen. Supt., Tonopah Mining Co., Tonopah.
Henry M. Rives, Secy., Nevada Mine Operators Assn., Reno.

NEW MEXICO

Chairman: J. T. Matson, Gen. Mgr., American Metal Co., of N. Mex., Tererro.
T. M. Cramer, Resident Mgr., U. S. Potash Co., Carlsbad.
C. S. Elayer, Mine Supt., American Smelting & Refg. Co., Vanadium.
E. H. Wells, Pres. & Director, New Mexico State School of Mines, Socorro.
Ira L. Wright Mng. Engr., Silver City.
J. F. Woodbury, Secy., New Mexico Chapter, American Mining Congress, Silver City.
R. B. Tempest, Nevada Consolidated Copper Corp., Hurley.

NORTHEASTERN DISTRICT

Chairman: C. Merrill Chapin, Jr., Vice Pres., St. Joseph Lead Co., New York, N. Y.
Lucien Eaton, Consulting Engineer, Copper Range Co., Painesdale, Mich.

State Chairmen



John G. Barry



Ross D. Leisk



Robert Linton



Max Bowen



W. H. Eardley



William Koerner



J. A. Caselton

Members - Program Committee



Roy B. Earling



Carl Zapffe



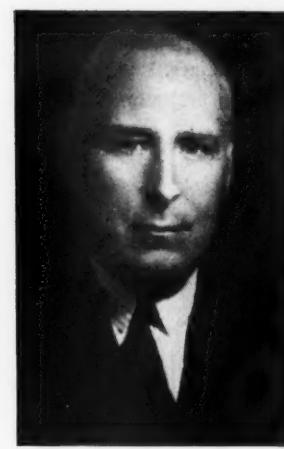
T. H. O'Brien



R. B. Tempest



J. G. Clark



Stanly A. Easton



Brent N. Rickard

E. V. Gent, Secy., American Zinc Institute, Inc., New York, N. Y.
R. R. Eckert, U. S. Copper Assn., New York, N. Y.
Chester A. Fulton, Pres., Southern Phosphate Corp., Baltimore, Md.
Howard Huston, Asst. to Pres., American Cyanamid Co., New York, N. Y.
Arthur Notman, Mng. Eng. & Geol., New York, N. Y.
Russell B. Paul, Asst. Mgr. of Mines, The New Jersey Zinc Co., New York, N. Y.
Felix E. Wormser, Secy.-Treas., Lead Industries Assn., New York, N. Y.

PACIFIC NORTHWEST

Chairman: Dean Milnor Roberts, College of Mines, University of Washington, Seattle.
Roy B. Earling, Gen. Mgr., Fairbanks Exploration Dept., U. S. Smelting, Refining & Mining Co., Fairbanks, Alaska.
R. M. Hardy, Pres., Sunshine Mining Co., Yakima, Wash.
D. I. Hayes, American Zinc, Lead & Smelting Co., Spokane, Wash.
Bliss Moore, Pres., Northwest Mining Assn., Spokane, Wash.
Stephen O'Brien, Spokane, Wash.

SOUTHEASTERN DISTRICT

Chairman: H. S. Salmon, Salmon & Cowin, Inc., Birmingham, Ala.
Clarence E. Abbott, Vice Pres., Tennessee Coal, Iron & R.R. Co., Birmingham, Ala.
H. A. Coy, Supt. of Mines, American Zinc Co., Mascot, Tenn.
F. H. Crockard, Republic Steel Corp., Birmingham, Ala.
Erskine Ramsay, Chairman of Board, Alabama By-Products Corp., Birmingham, Ala.

TEXAS

Chairman: John G. Barry, Consulting Engr., El Paso.
J. D. Collett, O'Keefe & Collett, Fort Worth.
J. P. Dyer, Phelps Dodge Corp., New York, N. Y.
W. T. Lundy, Vice Pres. & Gen. Mgr., Freeport Sulphur Co., New Orleans, La.
Brent N. Rickard, Mgr., El Paso Smelting Works, American Smelting & Refg. Co., El Paso.
H. F. Treichler, Gen. Mgr., Texas Gulf Sulphur Co., Newgulf.



Howard Huston



J. D. Collett



Chester A. Fulton



J. E. Berg

Members - Program Committee



D. I. Hayes



E. M. Norris



E. V. Gent

TRI-STATE DISTRICT

Chairman: H. W. Harrison, Commerce Mining & Royalty Co., Miami, Okla.
 C. F. Dike, Mgr., Interstate Zinc & Lead Co., Trece, Kans.
 F. S. Elfred, Jr., Pres., Evans-Wallower Lead Co., Cardin, Okla.
 L. G. Johnson, Mgr., Federal Mng. & Smelting Co., Baxter Springs, Kans.
 Evan Just, Secy., Tri-State Zinc & Lead Ore Producers Assn., Miami, Okla.
 J. G. Trewartha, Mgr., Century Zinc Co., Baxter Springs, Kans.

UTAH

Chairman: W. H. Eardley, U. S. Smelting, Refining & Mining Co., Salt Lake City.
 Cecil Fitch, Chief Consolidated Mining Co., Eureka.
 Ernest Gayford, General Engineering Co., Salt Lake City.
 A. G. Mackenzie, Secy., Utah Chapter, American Mining Congress, Salt Lake City.
 J. W. Wade, Tintic Standard Mining Co., Salt Lake City.
 Gloyd M. Wiles, Park City Cons. Mines Co., Park City.

A. B. Young, International S. & R. Co., Salt Lake City.

The convention sessions and exposition will be held in the Minerals Building, State Fair Grounds, situated only a little over a mile from the center of the city, and will open officially at 9 a. m. on Tuesday, September 7. At this time delegates will begin to assemble for registration and for inspection of the many splendid exhibits prior to the initial session, which will convene promptly at 10.30.

"Mineral Land Withdrawals" will be the first subject of this meeting and will be presented by Erskine R. Myer, Attorney at Law of Denver, Colo., and discussed by Dr. John W. Finch, Director of the United States Bureau of Mines, Washington, D. C. Rounding out this session the presentations next in order include: "Stream Pollution and the Mining Industry," by Robert M. Searls, Counsel, Newmont Mining Company, San Francisco, Calif., and "Building Roads to Prospective Mining Areas," by Dr. Francis A. Thomson, President, Montana School of Mines, Butte, Mont. Robert Linton, Consulting Engineer, Los Angeles, Calif., will act as chair-

*Members - Program
Committee*



S. R. Elliott



Henry M. Rives



Cecil Fitch



E. H. Wells



A. C. Callen



W. T. Lundy



L. D. Gordon



Albert F. Knorp



Felix E. Wormser



Ira L. Wright



F. C. van Deinse

*Members - Program
Committee*



Julian Boyd



J. F. McCarthy



H. E. Treichler



Robt. W. Thomas



G. Chester Brown

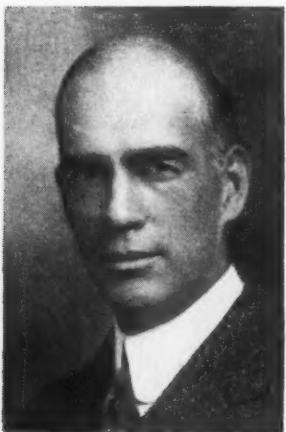


M. D. Harbaugh



C. B. Randall

Members - Program Committee



H. C. Bacorn

man of this session. Appointment of the Resolutions Committee will be announced at the close of this meeting.

A special welcoming luncheon to convention visitors will be held on Tuesday noon at the Hotel Newhouse, at which the ladies will also be in attendance. Presiding at the luncheon will be W. J. O'Connor, manager, American Smelting and Refining Company. Welcoming addresses will be made by Governor Henry H. Blood of Utah, and Mayor E. B. Erwin of Salt Lake City. Responses will be made by Howard I. Young, president of the American Mining Congress; Guy N. Bjorge, Chairman of the Program Committee; and William E. Goodman, chairman of the Manufacturers Division of the American Mining Congress. Following these brief talks, United States Senator William H. King of Utah will address the gathering on the subject, "The Intermountain Empire."

Discussions of monetary questions will feature the afternoon session, with D. D. Moffat, vice president of the Utah Copper Company, Salt Lake City, presiding. "The Money System of the Future" will be discussed by Rene Leon,

Members - Program Committee



Gloyd M. Wiles



J. Price Briscoe



Henry L. Day



T. M. Cramer



F. C. Gilbert



Evan Just



J. J. Carrigan

Members - Program Committee



C. E. Abbott



Lewis P. Larsen



Erskine Ramsay

Munds, Winslow and Potter, New York, N. Y.; and the subject of "Silver," equally important to mining men of the West, will be presented by United States Senator Key Pittman of Nevada. With the program of this meeting limited to these two papers, there should be ample time for discussion of these vitally important subjects from the floor.

Wednesday morning's session will present problems of mine ventilation, dust elimination and air conditioning. P. G. Beckett, vice president of the Phelps Dodge Corporation, Douglas, Ariz., will serve in the capacity of session chairman. Donald E. Cummings, field director of the Saranac Laboratory, Saranac Lake, N. Y., will discuss the subject of "Dust Elimination in Mines," a work in which he has taken a leading part in many of the great mines of this country. "Ventilation and Air Conditioning" will be the subject of an address by A. S. Richardson, ventilating engineer, Anaconda Copper Mining Company, Butte, Mont., which will also be discussed by William Koerner, general manager, Magma Copper Company, Superior, Ariz. With representatives of the two companies pioneering in this air-conditioning work in the United States presenting this subject, a most informative session is assured.

A luncheon meeting of the Board of Governors, Western Division, American Mining Congress, will be held after this session.

The afternoon meeting will be presided over by Jesse F. McDonald, governor, Colorado Chapter of the American Mining Congress, Denver, Colo. J. D. Ross, a member of the Securities and Exchange Commission of Seattle, Wash., is scheduled to address this session upon the "Application of the Securities Act to the Mining Industry," and his address will be followed by a round table discussion of this topic. Participating in this discussion will be: Samuel H. Dolbear, of Wright, Dolbear and Company, New York, N. Y., chairman of the Securities and Exchange Committee of the American Mining Congress; H. B. Fernald, Loomis, Saffern and Fernald, New York, N. Y.; D. A. Callahan, Wallace, Idaho; Bliss Moore, president

Members - Program Committee



H. A. Coy



J. F. Woodbury



J. W. Van Evera



Lucien Eaton



PROG

METAL MINING CONVENTION, WESTERN DI Minerals Building, Salt Lake Ci

TUESDAY, September 7

9.00 A. M. REGISTRATION AND INSPECTION OF EXHIBITS

10.30 A. M. FIRST SESSION

Chairman: ROBERT LINTON, Consulting Engineer, Los Angeles, Calif.

Mineral Land Withdrawals

ERSKINE R. MYER, Attorney at Law, Denver, Colo.

Discussion:

DR. JOHN W. FINCH, Director, United States Bureau of Mines, Washington, D. C.

Stream Pollution and the Mining Industry

ROBERT M. SEARLS, Counsel, Newmont Mining Corp., San Francisco, Calif.

Discussion

Building Roads to Prospective Mining Areas

FRANCIS A. THOMSON, President, Montana School of Mines, Butte, Mont.

Discussion

Appointment of Resolutions Committee

12.30 P. M. LUNCHEON AND WELCOME TO DELEGATES, Hotel Newhouse

Presiding: W. J. O'CONNOR, Manager, American Smelting & Refining Co., Salt Lake City, Utah

Welcome to Utah

HONORABLE HENRY H. BLOOD, Governor of Utah

HONORABLE E. B. ERWIN, Mayor of Salt Lake City

Response

HOWARD I. YOUNG, President, American Mining Congress

GUY N. BJORGE, Chairman, Program Committee

WM. E. GOODMAN, Chairman, Manufacturers Division, American Mining Congress

The Intermountain Empire

HONORABLE WILLIAM H. KING, United States Senator from Utah

2.30 P. M. SECOND SESSION

Chairman: D. D. MOFFAT, Vice President, Utah Copper Co., Salt Lake City

The Money System of the Future

RENE LEON, Munds, Winslow and Potter, New York, N. Y.

Discussion

Silver

HONORABLE KEY PITTMAN, United States Senator from Nevada

Discussion

6.30 P. M. DELEGATES PARTY

*Salt Lake Country Club—Dinner and Dancing
—Featured Entertainment*

WEDNESDAY, September 8

9.00 A. M. OPENING OF EXHIBITS

10.30 A. M. THIRD SESSION

Chairman: P. G. BECKETT, Vice President, Phelps Dodge Corporation, Douglas, Ariz.

Dust Elimination in Mines

DONALD E. CUMMINGS, Field Director, The Saranac Laboratory, Saranac Lake, N. Y.

Discussion

Ventilation and Air Conditioning

A. S. RICHARDSON, Ventilating Engineer, Anaconda Copper Mining Co., Butte, Mont.

Discussion

WM. KOERNER, General Manager, Magma Copper Co., Superior, Ariz.

Final Submission of Resolutions, to be referred to Resolutions Committee

12.30 P. M. LUNCHEON MEETING

Board of Governors, Western Division, American Mining Congress

2.30 P. M. FOURTH SESSION

Chairman: JESSE F. McDONALD, Governor, Colorado Chapter, American Mining Congress, Denver, Colo.

Application of Securities Act to Mining Industry

J. D. ROSS, Member, Securities and Exchange Commission, Seattle, Wash.

Discussion:

SAMUEL H. DOLBEAR, Chairman, S.E.C. Committee, American Mining Congress, New York, N. Y.

H. B. FERNALD, Loomis, Suffern and Fernald, New York, N. Y.

D. A. CALLAHAN, Wallace, Idaho

HONORABLE ABE MURDOCK, Congressman from Utah.

BLISS MOORE, President, Northwest Mining Association, Spokane, Wash.

CARL TRAUERMAN, President, Ruby Gulch Mining Co., Butte, Mont.

ROBT. S. PALMER, Secretary, Colorado Chapter, American Mining Congress, Denver, Colo.

CHAS. H. SEGERSTROM, President, Nevada-Massachusetts Co., Inc., Sonora, Calif.

5.00 P. M. MOUNTAIN BARBECUE

*In Big Cottonwood Canyon, in the Wasatch Mountains. Dancing at the Old Mill Club.
An evening never to be forgotten*

GRAM

VISION, THE AMERICAN MINING CONGRESS City, Utah, September 7-11, 1937

THURSDAY, September 9

9.00 A. M. OPENING OF EXHIBITS

10.30 A. M. FIFTH SESSION

Chairman: Wm. B. DALY, Manager of Mines, Anaconda Copper Mining Co., Butte, Mont.

Developments in Mechanical Loading

W. E. ROMIG, General Superintendent, Climax Molybdenum Co., Climax, Colo.

Discussion, with examples of slushing and drift mucking practice in various mines

Economics of Small Milling Plants

W. L. ZEIGLER, Mill Superintendent, Hecla Mining Co., Wallace, Idaho

Discussion:

ERNEST GAYFORD, Vice President, General Engineering Co., Salt Lake City, Utah

EDW. L. SWEENEY, Cons. Eng., Denver, Colo.

Reducing Costs of Workmen's Compensation

D. HARRINGTON, Chief, Health & Safety Branch, U. S. Bureau of Mines, Washington, D. C.

Discussion:

12.30 P. M. LUNCHEON MEETING

Board of Directors, American Mining Congress

2.30 P. M. SIXTH SESSION

Chairman: A. E. BENDELARI, Eagle-Picher Lead Co., Cincinnati, Ohio

What's On the Worker's Mind Today

WHITING WILLIAMS, Industrial Relations Consultant, Cleveland Ohio

Discussion

The Wagner Act As It Affects the Mining Industry

W. W. RAY, Attorney at Law, Salt Lake City, Utah

Discussion

7.00 P. M. ANNUAL
BANQUET, Western Division, American Mining Congress, Hotel Utah

Toastmaster:

W. MONT FERRY, Vice President, Silver King Coalition Mines Co., Salt Lake City, Utah

Guest Artist:

IGOR GORIN, famous Russian baritone; radio and screen favorite.

Special entertainment of high order



FRIDAY, September 10

9.00 A. M. OPENING OF EXHIBITS

10.30 A. M. SEVENTH SESSION

Chairman: D. A. CALLAHAN, Wallace, Idaho

Mine Taxation

W. MONT FERRY, Vice President, Silver King Coalition Mines Co., Salt Lake City, Utah

Discussion

Federal Finance and Taxation

ELLSWORTH C. ALVORD, Counsel, American Mining Congress, Washington, D. C.

Discussion

Depletion—Round Table Discussion

EVAN JUST, Secretary, Tri-State Zinc & Lead Ore Producers Association, Miami, Okla.

LEO J. HORAN, Secretary, Hecla Mining Co., Wallace, Idaho

J. T. MATSON, General Manager, American Metal Co., Tererro, N. Mex.

Rewriting the Revenue Laws

MORRISON SHAFROTH, Chief Counsel, Bureau of Internal Revenue, Washington, D. C.

2.30 P. M. EIGHTH SESSION

Chairman: J. C. KINNEAR, General Manager, Nevada Consolidated Copper Corp., McGill, Nev.

Wage and Hour Legislation

E. H. SNYDER, General Manager, Combined Metals Reduction Co., Stockton, Utah

Tariffs and Foreign Trade

(Speaker to be announced)

Report of Resolutons Committee

Adjournment

SATURDAY and
SUNDAY

SEPTEMBER 11-12

Trips to Park City, Tintic, Bingham, Midvale, Murray, International, Iron-ton, Magna and Garfield as arranged by Tours Committee, J. O. ELTON, Chairman.





Carona Arch, Arches National Monument, Moab, Utah.

of the Northwest Mining Association, Spokane, Wash.; Carl Trauerman, president of the Ruby Gulch Mining Company, Butte, Mont.; Robert S. Palmer, secretary, Colorado Chapter, American Mining Congress, Denver, Colo.; Charles H. Segerstrom, president, Nevada-Massachusetts Company, Inc., Sonora, Calif.; and Congressman Abe Murdock of Utah.

Developments in mechanical loading, economics of small milling plants, and reduction of workmen's compensation costs will be the subjects for consideration at the Thursday morning session of the convention when William B. Daly, manager of mines of the Anaconda Copper Mining Company, Butte, Mont., will preside. W. E. Romig, general superintendent, Climax Molybdenum Company, Climax, Colo., will give a paper on "Developments in Mechanical Loading" followed by a general discussion in which examples will be given of both slushing and drift mucking practice in various mines. The "Economics of Small Milling Plants" will be presented by W. H. Zeigler, mill superintendent, Hecla Mining Company, Wallace, Idaho, and discussed by Ernest Gayford, vice president, General Engineering Company, Salt Lake City and Edward L. Sweeney, consulting engineer, Denver, Colo. "Reducing Costs of Workmen's Compensation" is the subject to be presented by Dan Harrington, chief of the Health and Safety Branch, United States Bureau of Mines, Washington, D. C., which will doubtless develop considerable discussion.

The Board of Directors of the American Mining Congress will be convened for a luncheon meeting following this session.

Labor problems will highlight the afternoon meeting. Arthur E. Bendelari, Eagle Picher Lead Company, Cincinnati, Ohio, will act as session chairman. "What's on the Worker's Mind Today" will be discussed by Whiting Williams, industrial consultant of Cleveland, Ohio, who has been in the thick of recent labor unrest in the Middle West, and who speaks from a broad background of experience both as executive and day laborer in America's mines and industrial enterprises. "The Wagner Act As It Affects the Mining Industry" will be the topic of an address by W. W. Ray,

Attorney at Law of Salt Lake City. This session promises to be one of the most interesting of the entire convention.

Mine taxation and a round table discussion of mine depletion allowances will feature the Friday morning session with Donald A. Callahan, of Wallace, Idaho, serving as chairman. Addresses on these subjects and scheduled speakers include: "Mine Taxation," W. Mont Ferry, vice president of the Silver King Coalition Mines Company, Salt Lake City; "Federal Finance and Taxation," Ellsworth C. Alvord, counsel, American Mining Congress, Washington, D. C.; and "Rewriting the Revenue Laws," Morrison Shafrroth, chief counsel, Bureau of International Revenue, Washington, D. C.

Those who will participate in the round table discussion of depletion include: Evan Just, secretary, Tri-State Zinc and Lead Ore Producers Association, Miami, Okla.; Leo J. Hoban, secretary, Hecla Mining Company, Wallace, Idaho; and J. T. Matson, general manager, American Metal Company, Tererro, N. Mex.

The closing session of the convention, Friday afternoon, presided over by J. C. Kinnear, general manager, Nevada Consolidated Copper Corporation, McGill, Nev., will feature discussions of "Wage and Hour Legislation" and "Tariffs and Foreign Trade." Outstanding authorities on these topics are being secured as speakers.

At the Friday afternoon session, also, the Resolutions Committee will present its report, comprising a concise statement of the concerted views of the metal mining industry on vitally important economic and social questions facing it at the present time.

A splendid program of entertainment has been planned for each night of the convention. On Tuesday night the guests will assemble for dinner, dancing, and other special entertainment features on the lovely terrace of the Salt Lake Country Club for a very happy and jovial open air welcome.

Immediately following the Wednesday afternoon session convention visitors will embark in busses for a ride to Maxfield Lodge in beautiful Big Cottonwood Canyon, where a moonlight barbecue will be held around an open campfire. Brush up on your favorite old-time songs, for not many of them will be missed in the informal song-fest to follow, with subsequent dancing at the Old Mill. This promises to be an event not soon to be forgotten.

Culminating the entertainment program will be the annual banquet to be held at the Hotel Utah on Thursday night. Toastmaster at this colorful and delightful gathering will be W. Mont Ferry, vice president, Silver King Coalition Mines Company. An address will be given by an outstanding national figure, and entertainment will feature the appearance of the well known Russian baritone, Igor Gorin. Mr. Gorin is well known for his radio and screen work, having appeared on the Hollywood Hotel and Eddie Cantor programs.

Following the convention proper, trips will be made on Saturday and Sunday, September 11 and 12, to the various mining districts and metallurgical operations lying only a short distance from Salt Lake City. On Saturday, visitors will be given a choice of tours to underground mines at Bingham, Park City, or Tintic districts; to smelting and concentrating plants at Midvale, Murray and Tooele; or to the steel plant at Ironton. The Midvale plant is the lead smelter of the United States Smelting, Refining and Mining Company; the Murray plant is the lead smelter of the American Smelting and Refining Company; the Tooele plant is the copper and



The Framed Arch, Arches National Monument, Moab, Utah.

lead smelter of the International Smelting and Refining Company; and the Ironton steel plant is that of the Columbia Steel Company.

On Sunday a trip will be made to the Utah Copper Mine at Bingham, to concentrating plants at Magna, and to the Garfield smelter. This one trip will include all these operations.

Taking their cue from the name by which Utah is known, "The Beehive State," the groups responsible for outlining and effecting all the various local events mentioned above, have devoted a tremendous amount of time and energy to their tasks. These groups comprise the General Committee on Arrangements, the Entertainment Committee, the Dinner Committee, the Tours Committee, and the Publicity Committee. W. J. O'Connor, chairman of the General Arrangements Committee, has had the responsibility of coordinating all this work. Members of these various committees are as follows:

General Arrangements Committee: W. J. O'Connor, chairman, American Smelting and Refining Company; O. J. Egleston, U. S. Smelting, Refining and Mining Company; J. O. Elton, International Smelting and Refining Company; W. Mont Ferry, Silver King Coalition Mines Company; E. A. Hamilton, U. S. Smelting, Refining and Mining Company; James Ivers, Silver King Coalition Mines Company; C. T. Keigley, Columbia Steel Company; D. D. Moffat, Utah Copper Company; J. A. Norden, National Tunnel and Mines Company; J. D. Shilling, Utah Copper Company; G. W. Snyder, W. F. Snyder and Sons; J. W. Wade, Tintic Standard Mining Company.

Entertainment Committee: James Ivers, chairman, Silver King Coalition Mines Company; Nelson Aldrich, Utah Copper Company; James T. Brennan, Ingersoll-Rand Company; Louis Buchman, Utah Copper Company; W. Mont Ferry, Silver King Coalition Mines Company; A. J. Gibbons, Silver King Coalition Mines Company; William F. Koch, Hercules Powder Company; Tom Lyon, International Smelting and Refining Company; G. W. Snyder, W. F. Snyder and Sons; A. Soderberg, Utah Copper Company; Leland A. Walker, U. S. Smelting, Refining and Mining Company.

Dinner Committee: E. A. Hamilton, chairman, U. S. Smelting, Refining and Mining Company; Percy H. Kittle, Ohio Copper Company; E. M. Lillie, Ingersoll-Rand Company; M. D. Paine, Tintic Standard Mining Company; C. T. Van Winkle, mining engineer, Salt Lake City; B. C. J. Wheatlake, General Electric Company; Gloyd M. Wiles, Park City Cons. Mines Company; Leonard Wilson, Salt Lake City.

Tours Committee: J. O. Elton, chairman, International Smelting and Refining Company; Roy Hatch, Utah Copper Company; E. H. Snyder and G. W. Snyder, W. F. Snyder and Sons; Louis Buchman and J. D. Shilling, Utah Copper Company; L. E. Mackenzie and R. W. Senger, American Smelting and Refining Company; E. W. Engleman,

Utah Copper Company; W. H. Eardley and Robert Wallace, U. S. Smelting, Refining and Mining Company; L. K. Nicholson and R. Allen Perry, American Smelting and Refining Company; Paul H. Hunt, Park-Utah Cons. Mines Company; M. G. Heitzman, Silver King Coalition Mines Company; Lester R. Dobbs, Tintic Standard Mining Company; B. L. Sackett and A. B. Young, International Smelting and Refining Company; E. G. Jensen, Utah Ore Sampling Company.

Welcome to Delegates Committee: J. W. Wade, chairman, Tintic Standard Mining Company; Alfred Frank, engineer, Salt Lake City; Frank M. Gray, Atlas Powder Company; J. Fred Johnson, American Smelting and Refining Company; Duncan MacVie, consulting engineer, Salt Lake City; F. S. Mullock, U. S. Smelting, Refining and Mining Company; J. A. Norden, National Tunnel and Mines Company; W. J. O'Connor, American Smelting and Refining Company; H. E. Raddatz, Tintic Standard Mining Company.

Publicity Committee: G. W. Snyder, chairman, W. F. Snyder and Sons; Sam-

Chairmen Local Committees On Arrangement



James Ivers
Entertainment



Geo. W. Snyder
Publicity



J. W. Wade
Welcome to Delegates

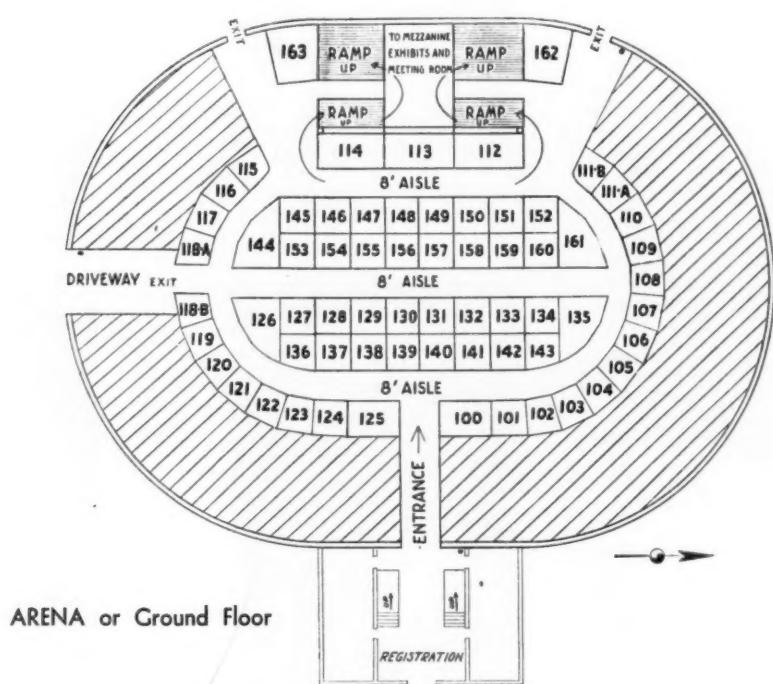
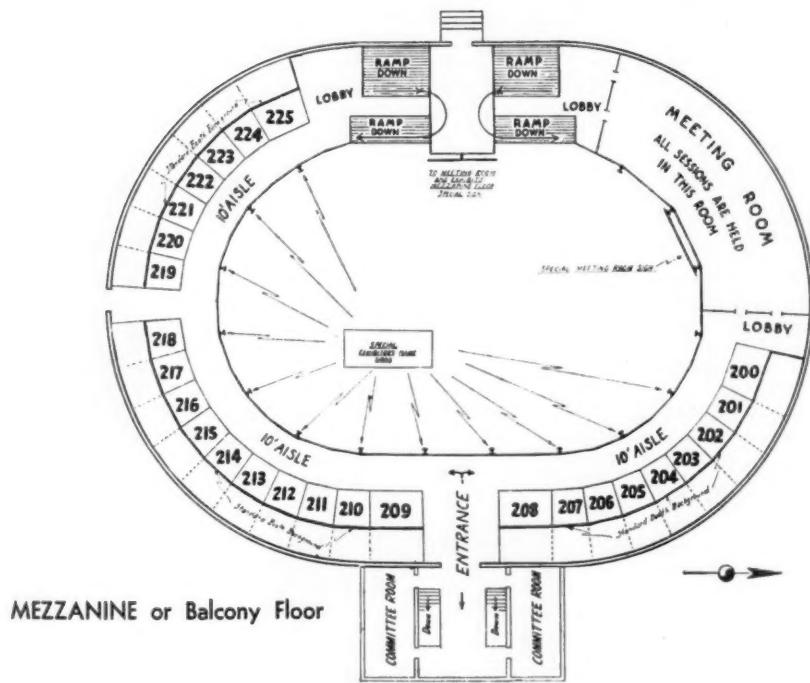


E. A. Hamilton
Dinner



J. O. Elton
Tours

*Floor Plans - Minerals Building,
Salt Lake City, Utah*



Exhibitors

MEZZANINE

American Brattice Cloth Co.
Atlas Publishing Co., Inc.
Coffing Hoist Co.
Coppus Engineering Co.
Cuprinol, Inc.
Denver Fire Clay Co.
E. I. du Pont de Nemours & Co., Inc.
Electric Railway Improvement Co.
Fairbanks, Morse & Co.
Garlock Packing Co.
Hersey & Co.
Linde Air Products Co.

Mineral States Exhibits
Mines Record
Mining Congress Journal
Mountain Fuel Supply Co.
Sauerman Bros.
Chas. A. Schieren Co.
Templeton, Kenly & Co.
Texas Co.
U. S. Bureau of Mines
Utah Fire Clay Co.
Utah Oil Refining Co.
Western Cartridge Co.
Whitmore Oxygen Co.



J. D. Shilling

Chairman, Exposition Committee

ARENA

Allen-Sherman-Hoff Co.
American Car & Foundry Co.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
Atlas Powder Co.
Austin Western Road Machinery Co.
Bethlehem Steel Co.
Broderick & Bascom Rope Co.
Bucyrus-Erie Co.
E. D. Bullard Co.
Byron Jackson Co.
C. S. Card Iron Works Co.
Carnegie-Illinois Steel Corp.
Caterpillar Tractor Co.
Colorado Fuel & Iron Corp.
Columbia Steel Co.
The Dorr Co.
Thomas A. Edison, Inc.
Eimco Corp.
Electric Storage Battery Co.
Galigher Co.
General Electric Co.
General Engineering Co.
Goodman Mfg. Co.
Gould Storage Battery Co.
Groch Engineering Co.
Hardinge Co.
Hercules Powder Co.
Independent Pneumatic Tool Co.
Jeffrey Mfg. Co.
Kennedy Van Saun Mfg. Co.

Koepsel & Love
Landes Tractor Co.
A. Leschen & Sons Rope Co.
Link-Belt Co.
McGraw-Hill Publishing Corp.
McNally-Pittsburg Mfg. Corp.
Mancha Storage Battery Locomotive Co.
Marion Steam Shovel Co.
Mine & Smelter Supply Co.
Mine Safety Appliances Co.
National Carbon Co., Inc.
National Tube Co.
Nickerson Machinery Co.
Oliver United Filters, Inc.
Robins Conveying Belt Co.
John A. Roebling's Sons Co.
Salt Lake Hardware Co.
Stephens-Adamson Mfg. Co.
St. Louis Power Shovel Co.
Sullivan Machinery Co.
W. O. & M. W. Talcott, Inc.
Tennessee Coal, Iron & R.R. Co.
Timken Roller Bearing Co.
U. S. Steel Corp.
Universal Atlas Cement Co.
Utah Power & Light Co.
Waukesha Motors Co.
Western Colorado Power Co.
Westinghouse Elec. & Mfg. Co.
Wood Shovel & Tool Co.



L. W. Shugg

Director of Exhibits

(Courtesy General Electric Co.)



Mt. Timpanogos, with Alpine Scenic Highway in foreground.

uel O. Bennion, *The Deseret News*; Burt B. Brewster, *Mining and Contracting Review*; A. L. Fish, *The Telegram*; J. F. Fitzpatrick, *The Tribune*.

Special entertainment for the ladies, in addition to entertainment features already outlined, has been planned under the direction of Mrs. W. Mont Ferry, general chairman of all the ladies' committees. Assisting in the plan for the joint luncheon with the men on Tuesday is a committee headed by Mrs. H. M. Hartmann. A luncheon on Wednesday noon given by the Women's Auxiliary of the A. I. M. E. at the Salt Lake Country Club, is being planned by a committee under the chairmanship of Mrs. E. A. Hamilton. Mrs. D. D. Moffat will be hostess to all the ladies at a tea to be held at her home on Thursday afternoon, preceding the banquet. On Friday noon a Tabernacle Concert will be held, followed by a luncheon at the Hotel Utah, plans for which are being made by a committee of which Mrs. R. A. Pallanch is chairman. Working in conjunction with the men's dinner committee in developing plans for this very important occasion, is a committee under the chairmanship of Mrs. James Wade.

Other committees that are devoting a great deal of thoughtful effort to insure a pleasant and enjoyable time to the hundreds of ladies that will attend with their husbands are as follows: Publicity, Mrs. Burt B. Brewster, chairman; Trans-

portation, Mrs. James Ivers, chairman; and Reception, Mrs. O. N. Friendly, chairman.

The exposition, held in conjunction with the convention, will feature exhibits by some 75 manufacturers of mining equipment and supplies. The displays which will be presented this year will constitute the largest and most diversified exhibit that has ever been held for the metal mining industry, including machinery and supplies covering all phases of mining and milling operations. Plans for the exposition are in the hands of the following committee, the chairman of which is J. D. Shilling, Utah Copper Company; Gibson T. Berry, Bingham Metals Company; L. E. Brown, Westinghouse Electric & Manufacturing Company; J. J. Fitzgerald, Colorado Fuel and Iron Company; Paul H. Hunt, Park-Utah Cons. Mines Company; W. R. Landwehr, American Smelting and Refining Company; Robert S. Lewis, University of Utah; F. B. Matheson, Gardner-Denver Company; A. C. Moore, Columbia Steel Company; O. J. Neslage, Sullivan Machinery Company; G. L. Oldright, U. S. Bureau of Mines; R. A. Pallanch, U. S. Smelting, Refining and Mining Company; John T. Potts, The Galigher Company; S. F. Ravitz, University of Utah; Morris Rosenblatt, Eimco Company; Arthur E. Smith, F. C. Richmond Machinery Company.

Through the courtesy of the General

Electric Company, Mr. L. W. Shugg is rendering invaluable assistance as director of exhibits.

A complete list to date of companies presenting exhibits, together with a floor plan showing location of booths, is presented on pages 46-47.

Mr. A. G. Mackenzie, secretary of the Utah Chapter of the American Mining Congress, through his hearty cooperation has been of the greatest help in formulating, coordinating and carrying through convention plans.

The scenic beauties offered by the region surrounding Salt Lake City are unsurpassed. In the immediate vicinity are many gorgeous drives, such as that through precipitous American Fork and Provo Canyons, encircling glacier-capped Timpanogos Mountain. Within easy striking distance are some of the most popular of our national parks, including Yellowstone, Bryce Canyon, Zion, and the Grand Canyon. Other charming sights may be viewed at the many national monuments easily accessible, such as Cedar Breaks, Arches, and Natural Bridges. Attendance at these meetings thus offers a splendid opportunity to combine business and pleasure.

"This is the place." Will you be there?

Of All Things . . .

Grand total of all benefits paid war veterans since the Revolutionary War to date is over \$21,000,000,000 says a news item. . . . That's no record. . . . The New Deal has spent nearly that much in six years and hasn't a war to show for it. . . .

The Indiana state treasury has a surplus. . . . Officials are still trying to explain their carelessness in letting that happen. . . . And how about importing some of those officials to Washington? . . .

Well, if Governor Lehman was the President's good right hand it's pretty obvious the left hand didn't know what the right hand was doing. . . .

The President, in his first term of office, vetoed 221 bills passed by the Congress. . . . No one heard anything about the Congress suggesting that the White House be packed. . . .

Add important bills being considered by Congress: . . . A bill to shorten the inch—by .0004 of a centimeter. . . . A bill to conserve homarus americanus—lobster in English. . . .

Out West a farmer reports that a two-headed calf he owns bawls through both mouths. . . . What a candidate for some political office! . . .

After all, \$60,000 in salaries for six advisers to the President isn't so bad and will be well worth the cost—if he will take their advice. . . .

Some people don't like that talk of the President's that he's a timber culturist and not a farmer at his Hyde Park estate. . . . Probably thinking of presidential timber for 1940, eh? . . .

Our idea of a politician is Mayor LaGuardia of New York. . . . He speaks a half dozen languages fluently—including Democratic and Republican. . . .

A Republican Congressman is authority for the statement that New Deal officials will have spent \$206,000,000 in travel allowances alone in 1936, 1937 and 1938. . . . That's only a little more than it cost to transport the 4,000,000 men of the A. E. F. to Europe and back home again. . . .

Mrs. Roosevelt, says a press item, hopes that her husband won't seek a third term. . . . She isn't alone in that wish. . . .

Now that the New Deal has produced a 388-page report on "Technological Trends and National Planning" we can look forward any day now to a Federal Commission of Gadgets. . . .

Nobody likes all this strike trouble in court—except the lawyers. . . . And they never strike. . . .

It might not be a bad idea to change the name of the Farm Credit Administration to the Travel Administration. . . . It spent \$1,762,000 last year seeing the country. . . . But Resettlement shouldn't be left out of consideration. . . . Its officials got rid of a cool \$6,200,000 in visiting the various projects. . . . WPA spent only \$2,000,000 last year but this year they asked for \$600,000 more, while Soil Conservation is just barely climbing into the million dollar class. . . . Wallace's Agriculture department is the winner, though. . . . \$7,000,000 to send men to Africa, China, Russia and almost every place in the world including one spot in India where they have as much as 270 inches of rainfall a year. . . . Probably they've got some ideas on what to do about the dust bowl now. . . .

Young Jimmy Roosevelt's keynoter address to the Young Democratic clubs of America this month makes it seem that, like the poor, the Roosevelts ye shall always have with you . . . especially in politics. . . .

There's little question that Black's nomination to the Supreme Court makes some of his colleagues blue. . . .

Henry Morgenthau is responsible for the handling of more money than any living man. . . . The other day, at his farm, finding himself broke, he had to borrow money to buy soft drinks for his family. . . . Wonder if his environment of the past few years with an organization consistently in the red is having its effect. . . .

The latest unofficial figure on the Government's debt, including obligations, is about \$41,000,000,000. . . . The annual interest, computed at an average of 2½ percent, is a billion a year or about \$1,950 per minute. . . . We'll take one minute's interest as our share. . . .



It really doesn't make much difference in which direction a new tax is thrown. . . . It always hits the ultimate consumer. . . .

It looks like we won't really have complete recovery until every man has a job from which to strike. . . .

Changing Standards in UNDERGROUND TRANSPORT

By LUCIEN EATON*

IN UNDERGROUND transportation, even more than in most of the other divisions of mining practice, the standards adopted a few years ago have changed as the limitations imposed by the equipment then available have been removed. These changes naturally have been greater in mechanical haulage than in hand-tramming, because the most important limitation of hand-tramming, the power of the human body, remains unchanged.

In hand-tramming it is still standard practice to use an end-dump car having a box that holds 20 cu. ft. These cars have 10 to 12-in. wheels with 18-in. wheel-base, and run on an 18-in. gauge track laid with 16-lb. rails. Switches usually have fixed points, and at plats and crossing "slick-plates" are often used. Hand-tramming is used at small mines and prospects, especially in narrow steep veins, where drifts are narrow and crooked. Such physical conditions have caused the general adoption of a relatively high and narrow car, although efficiency in loading would be increased, if the car body were made lower and wider. In spite of the reduction in rolling friction that they bring about, roller-bearings and ball-bearings are not in general use on cars used in hand-tramming, largely because of their higher cost, for, under the conditions where hand-tramming is used in the United States, the tonnage to be hauled is usually small, and the cost of equipment must be kept at a minimum.

In foreign countries where cheap labor is available, it may be more economical to move large tonnages by hand-tramming. Under these circumstances 20 cu. ft. rocker-dump cars with plain or ball-bearings are very popular.

Mules and horses are now seldom used underground.

The first step toward mechanical haulage is frequently the use of a small electric storage battery locomotive for hauling 1-ton cars coupled together with

chain links. This type of locomotive has been well standardized. It usually weighs 1½ tons, has a battery of 9 k.w.h. capacity, and has a draw-bar pull of about 450 lb. at 3.5 m.p.h. The overall height is 41 in. to 45 in. and the width of the battery box is usually 32½ in. The seat usually folds up, so that the locomotive can go on the cage and be easily transferred from one level to another.

In the larger mines using mechanical haulage, electric locomotives of either storage battery or trolley type have, except in a very few instances, superseded compressed-air locomotives, and gasoline locomotives are now seldom seen underground. Electric storage battery locomotives have increased in popularity, and their hauling range has increased enormously. A few years ago it was considered unprofitable to use storage battery locomotives for hauls longer than 1,500 ft., whereas now hauls up to a mile in length are negotiated without difficulty. This is due in great part to improvements in battery capacity.

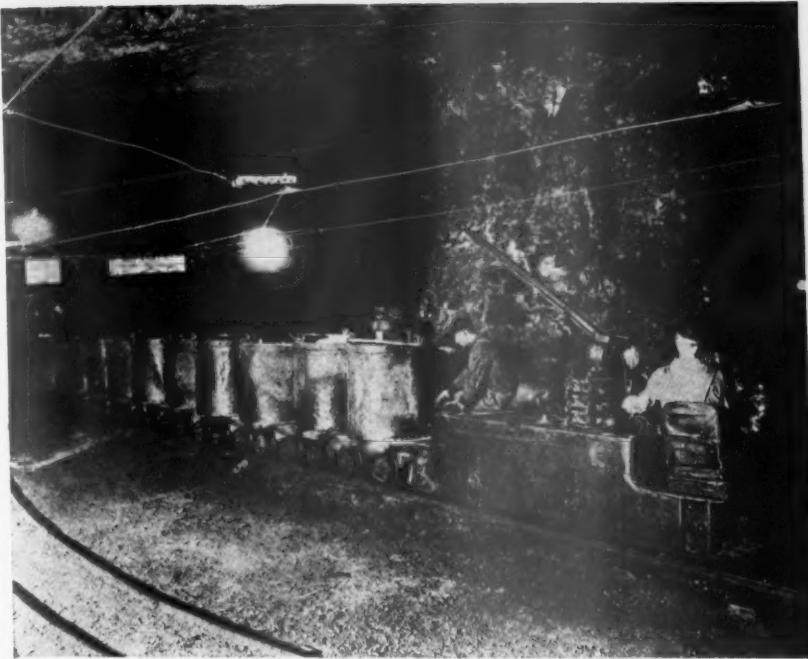
A few years ago 6-ton trolley locomotives and 4-ton or 5-ton cars were standard equipment, and hauls longer than

3,000 ft. were unusual. The length of haul has increased, and train capacity has increased proportionally, requiring larger cars and greater tractive effort. A track gauge of 30 in., which was standard, is the widest gauge that can be conveniently used in an 8-ft. by 8-ft. drift, and is the narrowest gauge that will accommodate the motors of a standard 6-ton locomotive or permit the use of straight frogs in the track. Where the ground has been strong enough to allow the use of drifts wider than 8 ft., the track gauge often has been increased to 36 in., and this in turn has permitted the use of larger locomotives. Thirty-six inches is now the standard gauge for tunnels or drifts 9 ft. by 9 ft. or larger in cross-section. If it is not feasible to widen the track gauge, it is good practice to couple two locomotives in tandem, using one controller for both locomotives.

Where the daily tonnage to be hauled by a locomotive is relatively small, especially if the haul is reasonably short, storage-battery locomotives are usually chosen, and trolley locomotives are used on the long hauls and for larger tonnages. The fields of the two types over-



* Consulting Engineer, Isle Royale Copper Company.



lap now more than ever. Where the hauls are long and the tonnage handled is very large, the best practice is now to use storage-battery locomotives of medium size for gathering cars and making up trains and to use large trolley locomotives for the main-line haul.

In details of locomotive construction there have been many changes. In the frames, steel has largely replaced cast-iron, and welds are taking the place of rivets. Cantilever leaf-springs are superseding coil-springs; alloy-steel wheels are replacing cast-iron wheels, and automatic couplers are in general use. In electrical equipment the standard motor size of 12 h.p. per ton of weight for trolley locomotives and half that for storage battery locomotives has not changed. Steel grids have replaced cast-iron and in the larger sizes or where locomotives are used in tandem, magnetic contractors with a master controller are generally used. Whereas a few years ago in nearly all headlights the glass was protected by an iron grid, now the bulls-eye type of lens without a metal protector is more commonly used and is a great improvement. Locomotives are now equipped with bells or horns as warning signals.

Not only has the size of cars increased but the design has changed also. End-dump cars are now rarely seen in trains, and gable-bottomed cars are growing scarcer. For coarse, heavy ore, cars of the Granby type with capacities from 3 to 11 tons have become popular. Drop-door cars are being used to some extent underground, and have many advantages, but are handicapped for general use, because they work best on a fairly wide track-gauge. For wet sloppy ores rocker-dump cars are a common choice. They have a high center of gravity, but have recently been much improved by a

change in the design of the rocker, which makes the car ride more steadily but dumps to one side only. Most large cars now have roller-bearings or ball-bearings and automatic couplers, which are $\frac{3}{4}$ -size rather than $\frac{1}{2}$ -size as formerly.

The importance of good track is now generally recognized, and better construction is the rule. Rails have not increased much in size, the 40-lb. and 50-lb. sizes being most used. Cast-steel and manganese-steel frogs have largely taken the place of fabricated frogs, and the latter are being welded instead of riveted.

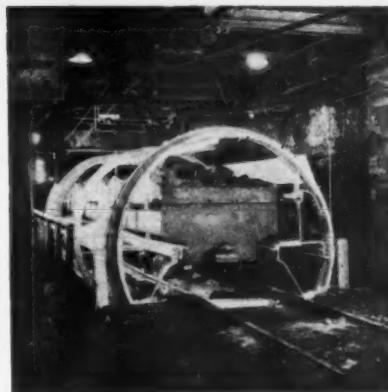
Block-signals of one kind or another are used on levels where more than one locomotive is employed. Ordinarily these consist of red lights controlled by hand-



thrown switches, but, where traffic is dense and speeds are high, may be almost as elaborate as those used on railroads.

Formerly we had two standards for underground transportation, namely (1) in hand-tramming, 1-ton cars running on 18-in. gauge track, and (2) in mechanical haulage, 4-ton or 5-ton cars and 6-ton locomotives running on 30-in. track. The scope of mechanical haulage has been increased, so that now we have three general standards for it, namely: (1) 1½-ton locomotives hauling 1-ton cars on 18-in. track, (2) 6-ton locomotives hauling 4- to 5-ton cars on 30-in. track, and (3) 8-ton to 15-ton locomotives hauling 6- to 10-ton cars on 36-in. track.

The benefits of large cars, however, go far beyond transportation, for large cars permit large chute-openings, and these in turn permit the passage of large pieces of ore; so that in blasting, fewer holes are needed, the burden on them may be increased, and less secondary



blasting is required. For these reasons, although the limit in size of equipment as far as transportation is concerned has apparently been reached further increases may be expected in the future where special conditions permit.

Changes in Caterpillar Sales Department

E. R. Galvin, general sales manager of Caterpillar Tractor Company, announced three sales department changes, to be effective July 20.

Paul Weeks, who was manager of the Washington, D. C., office of Caterpillar Tractor Company until his transfer to the Peoria office, about two years ago, returns to the capital post, relieving E. B. English, who, as a newcomer to Peoria, will become manager of Federal and state sales.

H. H. Howard, who has been in the employ of the company since 1926 in export and domestic sales capacities, has been appointed manager of the engine sales division.



Finishing a round at the face of Mount Weather, Va., testing adit.

The Work of the Bureau of Mines in Relation to the Metal Mining Industry

IT IS hardly necessary for me to say that the United States Bureau of Mines desires, above all things, to continue, in the same friendly spirit, its program of cooperation with the metal mining industry in research designed to assist American metal producers in meeting the severe competition from foreign producers of cheaply mined ores and to weather the stress of lean financial years.

It seems that there must be some central organization to lead in the stimulation of research, some focal point around which the forces of science may rally in the advancement of that program which has created millions of new wealth from the mineral discards of the past and which will in the future contribute to the development of great resources in the west which today cannot be utilized. Individual companies are not able alone to undertake the solution of the numerous complex problems involved. The Bureau of Mines endeavors to fill this role in some measure—but it can succeed only with your constant help and strong support.

* Director, U. S. Bureau of Mines.

By JOHN WELLINGTON FINCH *

The general aim is the improvement of mining and metallurgical practices, to obtain better quality at the same cost or equal quality at lower cost. Discoveries made in the past few years have enabled many of our important metal mining districts to continue operations through years of low prices. Many mines, which otherwise would have been too low grade to work, have, through improved processes, been enabled to continue operations. The life of some of the important western mining districts, in which a shortage of commercial ore was becoming apparent, has been indefinitely prolonged. Thousands of men have thus been given employment.

It is not alone in the field of efficient processes, however, that progress must be made. It is absolutely vital that the health of our mineral workers be preserved; that the lives and limbs of those who toil in these naturally hazardous

occupations be protected. Definite progress toward the goal of safer working conditions is being made.

I am glad that this brief resumé of the Bureau's work in the metal mining field comes to you at a time when steadily mounting figures of mineral production and better prices for metals are contributing their part to the general movement of recovery.

WORK OF MINING DIVISION

The work of the Bureau's Mining Division is closely linked to the interests of the metal mining industry of the western states. The functions of this division are designed to improve methods and practices in mining and to promote conservation of our mineral resources. This is a matter of national importance in view of the rapid depletion during the present century of our larger known deposits of high grade

ores and the resulting danger of serious competition from foreign producers possessed of large reserves of ores of higher grade, and who pay much lower wages. Improved technology in mining and milling, with special reference to ores of lower grade, is therefore essential to maintenance of the competitive position of our domestic producers.

Mineral Industries Survey.—Of considerable interest at this time is the Mineral Industries Survey, which was undertaken when the Interior Department appropriation bill for the fiscal year 1936 provided funds for "A mineral inventory and technical aid to small operators." This work includes field surveys and preparation of reports for publication on mining and milling practices and costs in various western mining districts, including the obtaining of data on known ore occurrences and existing development work thereon, and on haulage, freight, power, smelter and other costs. This survey is of value, not only to the large, established producers, but also to the great number of prospectors and small operators in the western states. The reports should serve to bring the possibilities of particular districts to the attention of investors, and may thus be of benefit to small operators in need of financial help.

In the course of visits to the various districts, thoroughly experienced Bureau engineers give technical advice, where so requested, to operators who obviously are financially unable to employ expert mining and ore dressing technologists. Where the operator is able to pay for technical assistance, the Bureau of Mines engineer is in a position to give the names of competent engineers, an effort being made to name men in the same district or at least in the same state. In July, 1937, as an outgrowth of this type of work, one Bureau engineer in Nevada had 40 visitors making inquiries regarding specific mining problems and prospects in certain districts.

Reports already published in this series deal with Shoshone County, Idaho; the Black Mountains of western Mohave County, Ariz.; Pershing County, Nev.; the Black Canyon area of Yavapai County, Ariz.; the Mojave district, Kern County, Calif.; and Mineral County, Nev. Reports in preparation for early publication relate to the Searchlight, Eldorado and other districts in Clark County, Nev.; the Wickenburg area in Arizona; the Tobacco Root Mountains, Madison County, Mont.; and gold mining in New Mexico. Surveys are now being conducted in Calaveras, Tuolumne and Mariposa Counties in the southern Mother Lode area of California.

Survey of Placer Deposits.—An interesting feature of the Mineral Industries Survey is the special survey of placer deposits in the various western states. In May of this year field work was started in Idaho for the gathering of data for a series of information circulars, each dealing with the placer deposits of a particular county. If state funds later become available, the complete results will probably be published as a bulletin of the Idaho Bureau of Mines and Geology, with which the Federal Bureau is cooperating. A comprehensive report on "Placer Mining in Nevada" has been published by the University of Nevada at Reno. In both states, the work was done at the request of the state mining departments.

Metal Mining Research Section.—A new activity in the mining division is the establishment of a Metal Mining Research Section, which will study fundamental mining problems, such as the applicability of special steel and bits for rock drilling in different kinds of rock; the application of compressed air in mining; signal systems in metal mines; preservation of timbers against fungus growth; special blasting problems; prevention and control of dusts in mining operations; and mine ventilation and air conditioning as applied to mines.

The section will also conduct mining and milling studies at operations in the central and eastern states.

Mount Weather Testing Adit.—This program of research provides for driving an adit and other workings therefrom on Government owned land at Mount Weather, Va., thus furnishing a unique testing laboratory in which to investigate important fundamental mining problems under simulated mine scale conditions, where interfering variables can be eliminated or controlled.

The Mining Research Section is conducting a study designed to obtain data for devising scientific methods of determining dangerous stresses in mine backs and pillars. Some encouragement has been found in preliminary work, using seismometers or rochelle salt crystal pickup with cathode ray oscillograph for recording. A special type of seismometer has been designed by the Bureau, which is employed for measurement in one ten-thousandths of an inch for vibrations caused by blasting in quarries and other places.

The study of rock drilling problems will include tests of drill rods and detachable bits of different types and steel compositions; determination of best types of bits for different kinds of ground, pulling long rounds in small headings, and the like. Blasting problems awaiting solution include the control of noxious gases produced, and elimination of hazards therefrom.

Mine Ventilation.—Mine ventilation is a problem of special importance. The Bureau's studies include an investigation in the field of conditions at individual mines, confidential reports and recommendations to the mine operators, and preparation of reports on mine ventilation methods and systems at individual mines or groups of mines for publication. Another feature is a study of air conditioning principles, methods, and practices; and of air conditioning apparatus in its application to air conditioning of mines. The whole question of air conditioning of mines is based upon temperature changes in mine air current, a subject so complex that only experience and direct observation can be relied upon until mathematical solutions are developed.

In these days when so much is heard of silicosis, the problem of dusts encountered in mining operations is of the greatest importance. The principal method used in this country for the determination of the concentration of dust in the air is the use of the impinger. The apparatus in general use is bulky and the method employed is involved. To simplify the process of determining dust concentration, the Bureau's Health Division has developed a small scale midget impinger, which is light, compact and hand operated, and which gives essentially the same results as the standard instrument.

Studies have been made in metal and coal mines to obtain information on the determination, generation and control of atmospheric dust. It was found that drilling vertical holes produced more



Air View of Garfield Copper Smelter, Utah.

dust than drilling horizontal holes; the amount of dust generated in drilling decreased with the depth of the hole; and wet drilling with sharp bits caused higher dust concentrations than with dull bits. The following procedures were found to be beneficial in reducing the dissemination of dust into the air: increased flow of water through the drill; reduction of air leakage through drill steel; use of compressed air-water blasts during and after blasting; generalized sprinkling of active workings; use of water curtains; and increased ventilation.

WORK OF METALLURGICAL DIVISION

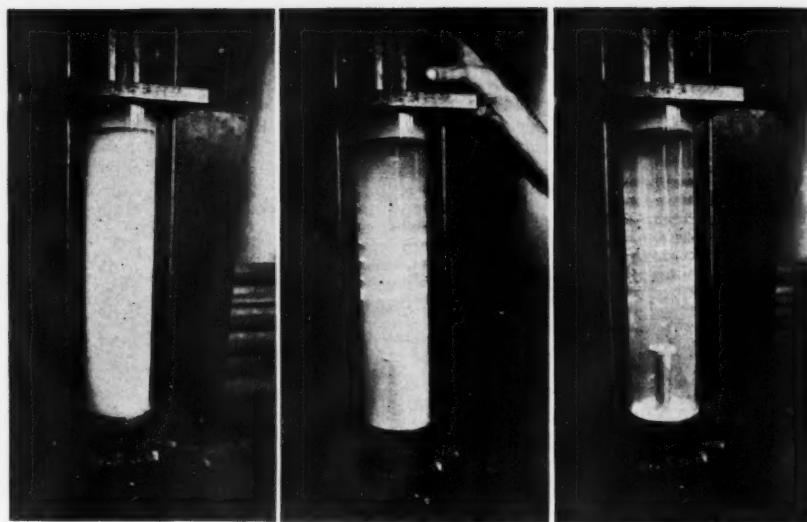
The specialists of the Bureau's Metallurgical Division have consistently striven toward three goals: the elimination of waste; improvements in metallurgical practice resulting in the best quality at the lowest cost; and the development of new metallurgical products.

Several noteworthy achievements have recently resulted from these investigations. One that received wide publicity was the application of high frequency, standing sound waves to the flocculation and removal of dust, smoke and fume from gaseous suspensions, such as occur in smelter stacks. This has aroused the interest of a wide variety of industries and communities in this country and abroad that are bent on the recovery of valuable products that now go up the smoke stack, or are faced with the problem of preventing air pollution. This method appears to have good possibilities for the solution of these problems and only awaits a practical method for the production of suitable standing waves.

Another interesting accomplishment of definitely practical value was the development of a new method for effecting the separation of gases of different densities or molecular weight by means of diffusion methods. It provides a mechanical means for separating gases in a manner just as simple as the separation of mineral particles by gravitational methods. While the phenomena and physical relationships of gas diffusion rates have been well known, an efficient means of utilizing the principles involved for technical purposes has not heretofore been demonstrated. This method promises to furnish a new and valuable tool for metallurgists and chemists dealing with gases and vapors. Experiments have already demonstrated the possibilities of the method in lowering costs of producing hydrogen.

Recent findings regarding a novel process for the treatment of chromite ores by chlorine, followed by the reduction of the chromium chlorides with hydrogen, suggest that pure chromium metal may be produced at lower cost.

The Bureau's metallurgical procedure, starting with theoretical considerations, continuing through laboratory development of new methods, and concluding with plant testing to the point of demonstrating practical application, is providing incentive to the establishment



An aerosol of ammonium chloride before, during, and following flocculation.

of new industries. Examples of recent new operations based on results obtained by the Bureau's metallurgists are the installation of a flotation unit to treat scheelite slimes, and the construction of a mill to separate talc and magnesite by flotation.

Metallurgical Fundamentals.—A small group of engineers in the Bureau of Mines has devoted many years to the development of the thermodynamic method of studying metallurgical reactions, work which is of considerable practical importance to continued progress in the metal industry.

The use of thermodynamic methods may be illustrated as follows. If the metallurgical engineer wishes to design a new process, he may start out by writing up so-called paper reactions. He might then proceed by cut-and-try methods to determine if such a reaction would proceed at all, and if so at what temperature and pressure it would proceed best. This is a laborious and time consuming procedure and would limit the number of guesses which might be tried out to one or two per year. Chemical thermodynamics teaches us how to predict the extent to which reactions will proceed at any temperature and pressure, provided we know for the substance involved certain simple constants for the reacting substances, such as heat of formation, specific heat, and entropy.

Obviously, the number of substances which enter into important metallurgical reactions is small compared to the total number of reactions, so that it is more satisfactory to proceed from the general approach and determine the necessary physical constants. Thus, entropies are determined for the very practical reason that they enable one to check more paper reactions in a day than could be done in a year by individual experiment.

New metallurgical processes may therefore be carried through the laboratory stage in a far shorter time than

can be done without the aid of reliable thermodynamic calculations. Many examples could be cited of the great labor saving advantage of this general method of approach.

Mineral Physics.—The group of Bureau specialists devoting their energies to the study of mineral physics is newer and yet it has shown its worth conclusively. All metallurgical processes start with minerals—yet there is a surprising dearth of knowledge concerning mineral properties, except for identification purposes.

For instance, in the problem of iron ore concentration, which must eventually be faced, magnetic concentration is the first solution which occurs to the engineer. But engineers have been working on this problem for years and have not satisfactorily solved it, because of a lack of knowledge of how to control the magnetic properties of iron oxide. Our work on mineral physics, we think, furnished this knowledge—not specifically, but generally, by determining once and for all what is the effect of state of aggregation and physical and thermal treatment on substances containing atoms which in some combinations are ferromagnetic. An outgrowth of these studies is the provision of an entirely new class of permanent magnets made of very finely divided iron and cobalt, which promise to be of considerable commercial importance.

Ore Testing Work.—During the past few years there has been an insistent demand for ore testing services by the Bureau. This work is now being undertaken, but in such a manner as not to compete with consulting engineers or commercial laboratories. Studies leading to the standardization of testing methods, routine analyses and tests incidental to investigations of the Bureau and other Government agencies, and chemical and microscopic analyses of ores that are typical of a mining district are being conducted, and recommendations made as to suitable ore

dressing practices. There is an opportunity in this work to perform a real service to the mineral industry through the solution of problems in devising methods of treatment of ore deposits which have not been developed.

New Federal Power Projects.—Vast hydroelectric power developments at Boulder Dam, Muscle Shoals, and other Federal projects emphasize the need for possible outlets for surplus power. The Bureau is studying the possibilities of using this power in exploitation of mineral deposits. In the general region surrounding Boulder Dam there occurs a wide range of commercially valuable and accessible minerals and ores, including lead, zinc, copper, iron, tungsten, manganese, limestone, dolomite, gypsum, borates, celestite and salines.

Work started at the Electrometallurgical Laboratory at Boulder City, Nev., more than a year ago, when funds were provided to acquire a building and purchase equipment. Early activities were restricted to three definite problems in the electrometallurgical use of mineral resources. These are: the production of electrolytic manganese; treatment of low grade chrome ores; and production of potash and alumina in marketable form from alunites.

The production of electrolytic manganese in the laboratory has no doubt already come to your attention. Conditions have been established through which metallic manganese with a purity of 99.85 percent has been produced by the electrolysis of solutions obtained from the leaching of low grade ores. This work is going steadily forward to determine the economic possibilities of the process.

At the beginning of the fiscal year 1937, the work of the Electrometallurgical Section was expanded by the addition of a small unit at Washington State College, Pullman, Wash., to investigate the production of magnesium from Washington magnesites.

A matter of considerable importance to the metal producers of the western states is the proposed enlargement of the Intermountain Experiment Station of the Bureau of Mines at Salt Lake City. The bill providing for the construction and equipment of a building

for the station was favorably reported at the present session of Congress, but passage was deferred because the initiation of such projects at this time is not in harmony with the Administration's financial program. It is, of course, hoped that the necessary legislation may be obtained at some not too distant date.

The Bureau has long desired a station of this nature large enough to take care of investigations of the treatment and the methods of production of the great mineral deposits that surround Salt Lake City for a radius of several hundred miles. The enlarged station would investigate problems of broad general interest to the nonferrous metals industries that are beyond the capacity of facilities at the existing smaller stations, devoted largely to local problems. Salt Lake City is centrally located to investigate conveniently the ores of Montana, Idaho, Utah, Nevada, and the western part of Colorado. It is proposed that the work of the Bureau's other experiment stations shall continue without curtailment as they have their special usefulness.

STATISTICS

Through its Economics and Statistics branch, the Bureau provides the mineral industry with statistics covering the production and marketing phases of virtually all mineral products. Approximately 200 separate canvasses are conducted, including 180 on an annual and 20 on a quarterly, monthly, or weekly basis. The results of these surveys are released immediately upon completion to assure maximum use to the mining industry and the public, and in addition a comprehensive summary of the entire industry is prepared and published annually as the Minerals Yearbook. These volumes and their predecessors, Mineral Resources of the United States, constitute the most complete historical record of mining possessed by any nation.

The Bureau's statistical services to the metal industries include detailed annual reports on mine, smelter, and refinery production, consumption, stocks, foreign trade and prices. This is the only branch of mining for which the Bureau does not provide some quarterly or monthly data. This is due in part to

lack of funds and in part to the fact that the major metals are supplied with adequate current statistics by trade associations and other private agencies. There is urgent need for more frequent information on some phases of this industry, particularly on secondary metals, and every effort is being made to meet this need. Last year the Bureau provided for the first time a comprehensive survey of the consumption of iron and steel scrap. This service proved to be so valuable that the industry has requested Congress to provide the funds necessary to establish it on a permanent basis.

Besides the large volume of data on commodities, the Bureau collects annual statistics on employment and accidents. Employment data have been useful in various relief activities and in computing productivity trends to show improvement in the efficiency of production and the future possibilities of employment in mining. Accident statistics vividly portray the effectiveness of safety practices in the mineral industries.

In recognition of the important effects of foreign markets and supplies on domestic industries, the Bureau also collects detailed statistics on production, consumption and international trade in foreign minerals.

The chief value of statistics to the mineral industry is in providing producers with reliable data to aid them in formulating immediate and long time operating programs. The need of accurate profit and loss statements and cost accounts as prerequisites to efficient conduct of mine operations is now widely recognized. Reliable statistics on production, consumption, stocks, and price trends are equally indispensable in the determination of the broader aspects of company policy. They are no less essential in solving the problems of individual industries. For instance, the Government's efforts to assist in stabilizing the petroleum and coal industries would be hopeless without accurate statistical data.

Aside from their more general value as indicators of basic trends, statistics serve many other useful purposes. Accident statistics published annually by the Bureau permit the operator to compare his own safety record with that of others in the same industry. Likewise, significant trends in technology frequently are revealed most effectively through the medium of statistics. Statistics can and should be used as an ally of technologic research. Too often operators have struggled to effect economies of a few cents here and there only to find that these savings have been obliterated by a precipitous decline in price brought on by disregard of fundamental economic conditions. Thorough understanding of these conditions, as revealed by the statistical record, should be the foundation of all research programs.

A valuable byproduct of the Bureau's statistical work not generally appreciated

(Concluded on page 63)



Electrometallurgical Laboratory of the U. S. Bureau of Mines, Boulder City, Nev.

Notes On Mine PUMPING PRACTICE

Cripple Creek District

THE handling of underground water has been a problem in Cripple Creek mines almost from the date of discovery. In sinking some of the first shafts, ground water was encountered at a shallow depth.

The difficulty and expense of pumping as the mines attained greater depth soon caused the operators to consider drainage tunnels as a solution. Several shallow tunnels were driven and these were successful on a small scale. The operators of the El Paso mine, located in a phonolitic plug south of the main Cripple Creek crater, drove a tunnel at elevation 8,790 ft., which passed under the El Paso shaft at the present fourth level and continued 700 ft. towards the crater. The Beacon Hill plug is evidently connected with the main crater by fissures, for the Elkton mine, within the crater, was soon drained to elevation 8,844 ft. The first conclusion was that the crater area was so interconnected by fissure systems that tapping the crater breccia at one point would drain all parts. This may have been true at shallow depth, but at the elevation of the El Paso tunnel and the later Roosevelt tunnel (elevation 8,020 ft.) it was found that the effect of the tunnels was purely local; that is, when a fissure on which a mine was situated was cut, that mine and any other near by which were on the same main fissure, or a branch, were drained. In other parts of the crater the drainage effect was negligible.

The Roosevelt tunnel was started in 1907 through the cooperation of the major operators. It was driven at elevation 8,020 ft., 14,550 ft. to the El Paso shaft. The El Paso vein system brought in a flow of 1,000 gals. per minute, but the El Paso workings were not drained to any extent until a churn drill hole connection was made with the shaft. Thus it was found that it would be necessary to connect with all the main shafts to obtain rapid drainage. This was done eventually, and by 1918 the Elkton, Cresson, Portland, Vindicator, and Golden Cycle mines had connections with the tunnel either directly or through intermediate crosscuts.

The northern and western parts of the district were slowly drained so that now most of the mines on the north contact are drained as far as they have been worked, about 1,600 ft. in the case of the

Isabella. There are three exceptions: the Cameron, Pinnacle, and School Section mines encountered water when the shafts reached the level of the adjacent valley floor, which acts as a basin and where the water table is practically at surface. This is a purely local condition and is caused by the fact that the surface water will not drain through the underlying rock as fast as it collects. Neighboring mines further up the hillside have no water except some surface water which collects in very wet seasons.

When the drainage tunnel was completed, and even prior to that time, many mines continued sinking shafts below the tunnel level, pumping water to this level. The Golden Cycle mine, which did not get a connection through to the tunnel until 1918, pumped 900 gals. per minute through to surface for several years. The Cresson has a shaft 380 ft. below the tunnel, the Portland 1,000 ft. below, the Vindicator 125 ft., and the Golden Cycle 200 ft. The Ajax mine started sinking below the tunnel level in 1934 and is now about to cut a station 600 ft. below the drainage tunnel.

The rate of flow in shaft sinking and development operations is found to vary considerably according to a number of factors, such as size of the open fissures encountered, depth below the water table the shaft is sunk, porosity of the country rock, etc. Certain types of breccia, such as the Cresson "blowout" or collapse breccia, are said to "hold water like a sponge."

It has never been possible to predict accurately what flow might be expected in any contemplated shaft-sinking operation.

In most cases very little water is developed in sinking operations below the drainage level unless some major fissure is cut. The water is usually cut after lateral work is started. The Portland shaft, which reached a total depth of 1,000 ft. below the drainage tunnel, was sunk over a period of years, the area at each of several levels being partly drained before the next lift was sunk. Thus there was never a high head on the water which was cut in sinking. The

By M. H. SALSBURY *

water pumped at the finish was very nearly the same as was handled in the first 150 ft. The Cresson shaft never made much water until a large fissure was cut in the sump under the twentieth level.

The rate of flow in the Golden Cycle shaft did not increase very much with depth nor did it increase appreciably in the Ajax shaft or winze until, in the shaft, a large open fissure, the Bobtail vein, was cut.

The flows of water encountered in lateral development also vary greatly. In no case does the flow from any one fissure remain constant. As the area traversed by the fissure is drained, the head on the flow decreases and the amount of water diminishes. Under a constant set of conditions, the flow of water to a pumping station will gradually decrease over a period of time.

The flow on the bottom level of the Portland, which had been approximately 1,000 g.p.m., was 650 g.p.m. at the time the workings were abandoned and flooded.

At the Cresson the flow had lessened from a maximum of 5,200 g.p.m. to 3,300 g.p.m. in less than three years, after development of undrained areas was stopped.

The same is true in every other mine which has pumped water for any length of time.

In the original development of the mines of the district where water was handled, the standard steam pumps of that day were used. They were expensive to buy, install, and operate, and probably these characteristics did much to stimulate the driving of drainage tunnels.

The development of triplex and centrifugal pumps and the advance in electrical equipment rapidly rendered steam pumps obsolete.

Only one large triplex pump installation was made: three 300-g.p.m. pumps driven by 175-hp. motors at the Golden Cycle mine. This plant was abandoned when the drainage connection was made.

Centrifugal pumps have become standard in Cripple Creek practice for large

* Superintendent, Portland Mine, Victor, Colo.

quantities of water and heads over 150 ft. Only one mine, the Cameron, uses a triplex type, electrically driven, to handle a small flow of water against an 800-ft. head.

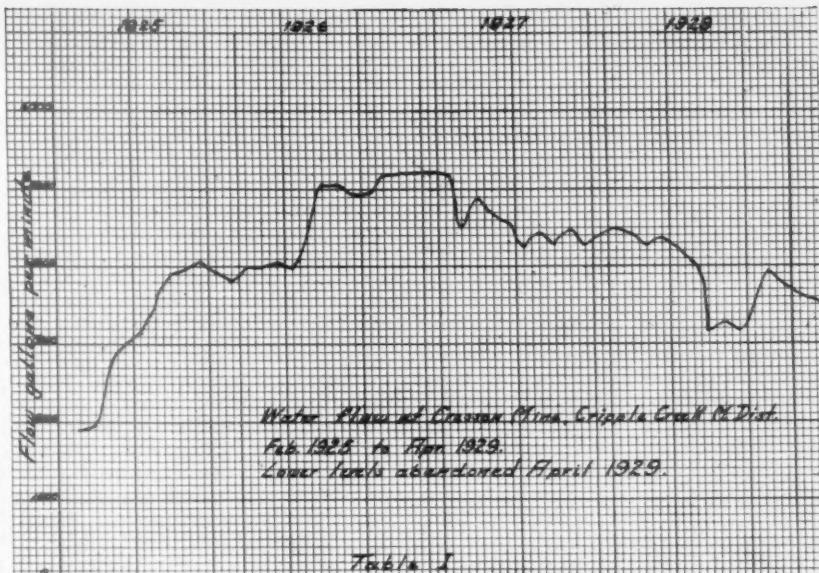
Most of the standard makes of centrifugals, Buffalo, Lecourtenay, Maniste, Byron Jackson, Goulds and others have been used in various installations. No particular preference has been shown for any one make.

For shaft sinking Cameron sinkers operating on air have been used almost exclusively until recently. For small flows, where excessive power consumption is not an important item, they are very satisfactory.

When the Ajax winze was started in 1935 the new light centrifugals, air operated, were tried and found satisfactory within their scope: low heads (not over 50 ft.) and moderate flows up to 125 g.p.m. They were used at the Ajax in conjunction with a Cameron sinker which relayed the water to the pump station above. Their light weight makes them very convenient in the bottom of a shaft, as they are very easily handled. It was found, however, that maintenance costs were high in the severe service of shaft sinking where abrasives cut out the cases and impellers rapidly.

In the latest shaft-sinking operation at the Ajax, electric sinkers have been used in conjunction with air-tube centrifugals. The latter were used in the bottom to pump to the electric sinker, which was kept within 50 ft. of the bottom. Later, the air-driven centrifugals were discarded and the electric sinkers placed in the bottom.

At this time three shafts are being operated below the drainage tunnel: Ajax, 600 ft. below; Cresson, 125 ft.; and the Portland, 150 ft. The Cameron mine, although not below the drainage



level, is pumping water about 1,000 ft. The Vindicator has just abandoned its twenty-first level, 125 ft. below the drainage connection.

The pumping problem in this district has never been the handling of very large flows—many other localities have had larger ones—but rather how to handle the water at a cost which will not be prohibitive, considering the size of the ore bodies being developed. These are comparatively small and no great expenditure is justified.

In several instances this has resulted in carrying on sinking and development operations with inadequate equipment.

In the case of shaft sinking there is no remedy for lack of equipment except to buy more, and this is a serious matter, for it cannot always be obtained on short notice.

In later development we have a remedy for pumping equipment which is not large enough to handle an unexpected flow. By the installation of water-tight concrete bulkheads with steel doors, an excessive flow can be controlled if it is inadvertently developed. (See Fig. 1.) In development in undrained ground it is the rule here not to shoot a round if an unusual amount of water is shown in the drill holes. In fact, a pilot hole is often carried ahead of the regular round as a safeguard. Occasionally, however, a round is shot which brings in water which is not expected and the bulkheads then come into use. This method is possible because the heaviest flows gradually lessen after a few days or weeks, and eventually the pumps can handle them.

In 1923 the Cresson shaft was sunk 381 ft. below the drainage tunnel and extensive lateral development was undertaken. Very little water was cut in the shaft and a Cameron 9 B sinker handled it easily. In the sump at the bottom, however, a flow estimated at 5,000 g.p.m. stopped sinking operations. The drill holes were plugged. The largest flow in the district to date was developed in the lateral work on the twentieth level, 5,200 g.p.m. having been pumped at the peak, and the plant was taxed to the utmost. Nine pumps, including two moved down from the eighteenth level and run in series, with a total connected load of 845 hp., were used. These were four-stage Manistee and Worthington pumps. Power was obtained through two marine-type, lead-covered, three-wire, 2,300-volt

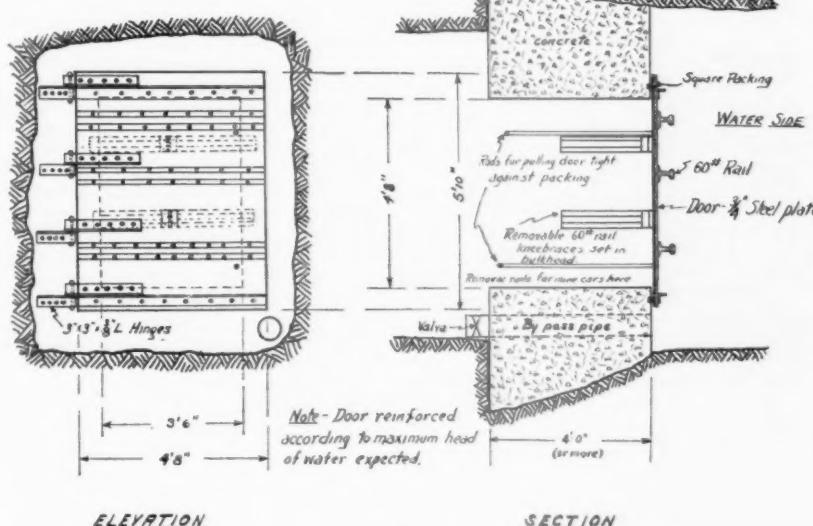


FIGURE 1

Sketch of water bulkhead door, Ajax Mine, Victor, Colo. 2,300 Winze Level, July 31, 1937.

cables, one installed in the manway and one put down through a 3-in. borehole to guard against interruption of the power supply. For a complete description of the operation, see page 230 of the March, 1929, issue of *THE MINING CONGRESS JOURNAL*.

The lower levels of the Cresson were abandoned in 1929, and in 1936 it was decided to unwater the shaft as far as the 1,800 level, a distance of 125 ft. The water column in the shaft was utilized, together with three other columns which were installed, and air lifts were operated. The installation was very satisfactory and an exceptionally good cost record was made. The shaft below the 1,800 level made an adequate submergence possible. The maximum flow was 2,215 g.p.m. in September, 1936. The flow gradually diminished as stopes and country rock were drained, and at present writing is not over 800 g.p.m. average.

The Ajax mine was acquired in 1933 by the Colorado International Mining Corporation, which immediately proceeded to sink the shaft 157 ft. to develop the downward extension of the New Market and Mohican ore shoots, which had been very productive to the water level. It was necessary first to drive a drainage tunnel some 2,000 ft. to connect with the Portland drainage crosscut. The shaft work was accomplished with little difficulty. A proper pump station was not installed on the 2,100 level, nor were bulkheads put in. Thus a heavy flow of water, cut in developing the New Market vein, flooded the workings up to the 2,000-ft. level, and considerable difficulty was experienced in recovering the 2,100 level.

A 480-volt three-wire cable was installed for this work but was found inadequate later on. At this voltage copper losses are excessive with a reasonably sized cable.

In 1935 the Golden Cycle Corporation acquired the mine, and a winze was sunk 239 ft. between the New Market and Mohican veins. The water flow was moderate and little trouble was experienced until a heavy flow was encountered at the point where the 2,300 station was to be cut. Rather than risk flooding the winze by sinking further, the level was established a few feet higher than planned.

The first air-driven centrifugal pumps were used in this winze. For the first 50 ft. they pumped direct to 2,100, next they pumped to a Cameron sucker which relayed the water to 2,100, and finally the water was handled in three steps—air-driven centrifugals to Cameron sucker, to 2,200 station pump, to 2,100. A maximum of four small centrifugals with a combined capacity of 500 g.p.m. up to 50-ft. head were used. Then air consumption was found to be rather high, especially after they became a little worn. Open impeller types were found to be best. Not over 200 g.p.m. were handled at any time during the work except when beating down the water after firing shots.

On the 2,300 winze level a large sump station was cut and three three-stage pumps were installed; a fourth was added later. (See Fig. 2.) The installation as completed included one 1,200-g.p.m. two-stage 415-ft. head Goulds pump, one 800-g.p.m. two-stage 415-head Goulds, one 750-g.p.m. two-stage 415-head Manistee, one 750-g.p.m. three-stage 360-ft. head Lecourtenay, all rated at 1,750 r.p.m. and driven by a total of 550 hp. The Lecourtenay and Manistee pumps were formerly used at the Portland and Cresson and the Goulds pumps were purchased new. A settling sump and a pump sump with a partition were used. This is standard practice to keep as much abrasive material as possible out of the pumps. One part of the pump sump can be cleaned out while the other is still in use. Bulkheads in the main east and west crosscuts were installed. All these features proved to be of great value later.

In the west crosscut, cutting the Mo-

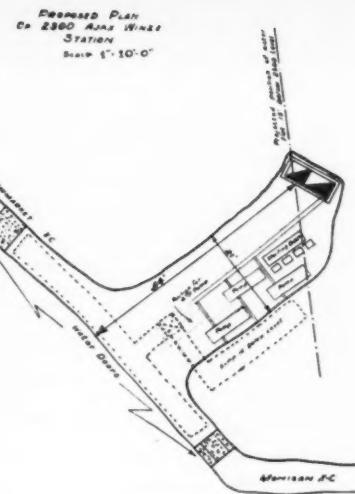


FIGURE 2

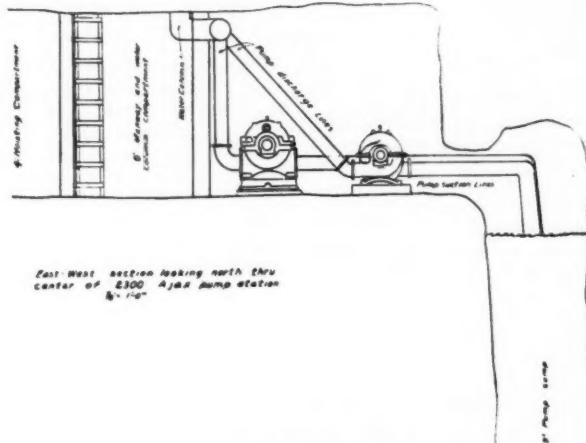


FIGURE 3

hican vein developed a flow of water which necessitated closing the water door. It was kept closed for some time and finally the maximum flow, 3,500 g.p.m., diminished. In the east crosscut, cutting the New Market fault brought in more water, and, what was even more serious, highly abrasive sand and slime were carried out of the fault by the force of the water. This filled up the settling sump immediately and for a time it was a question whether the pumps would fail through excessive wear or not. The sand flow was finally controlled by a steel plate box put in the crosscut through the fault, with bags of concrete tamped in around it, after several bales of hay had been tamped in first. This served to stop most of the sand and slime. The maximum flow on the 2,300 level was 3,700 g.p.m., which was pumped direct to 2,000 without an intermediate pumping station. The flow by December, 1936, was not over 2,500 g.p.m.

This pump station was installed with 2,300-volt three-phase service, which has proved very satisfactory.

In December, 1936, work was started sinking the main shaft. It was put down some 362 ft. below the 2,100 level without much difficulty, using air centrifugals and a 600-g.p.m. American Marsh electric sucker, plus a centrifugal station pump on 2,200 after the head made it advisable. At the 362-ft. mark, where the 2,400 station was to be placed, the flat-dipping Bobtail vein was cut. This was not unexpected, but the operators had hoped to cut the vein sooner where the head on any water flow would be less. The water which developed in a large fissure taxed the sinking pumps to capacity, and sinking further was impossible with the equipment on hand.

Something new in this district was then attempted. A horizontal hole, drilled about 10 ft. in the wall of the station where water was flowing, was pumped full of sawdust with encouraging results. The flow almost stopped. Next a 25-ft. diamond drill hole was put down vertically in the floor of the station and pumped full of grouting. This was quite ineffective, so several deep machine drill holes were put down in the

shaft and grouted. This cut off the flow from the fissure in the shaft to a large extent. The grouting was pumped with an ordinary small boiler feed pump. After repairing the sinker and rigging up a spare Byron Jackson 500-g.p.m. sinker, the shaft was continued another 100 ft. with some difficulty. About 700 g.p.m. was being pumped.

The possibility of grouting out water flows in shaft sinking under these conditions is worth further investigation. If properly worked out, a very effective system might be devised. If the shafts can be sunk in comparatively dry ground, one of the most expensive items in this type of work is eliminated or kept at a minimum.

At 100 ft. below 2,400, the shaft pumping equipment, which had been running at top capacity, began to cause trouble. A series of breakdowns, such as pump failures, motor failures, and temporary power interruptions, resulted in the shaft being flooded up to the 2,300 level pump station. The trouble was aggravated by lack of sufficient reserve equipment.

The operation was then reorganized; all equipment was overhauled, and a new electric American Marsh 1,200-g.p.m. single-stage open-impeller sinker was built in the mine shops. The air-operated centrifugal pumps were discarded. The full capacity of the new sinker is utilized in getting back to the bottom after blasting.

The shaft was unwatered, the 2,400 level enlarged, and two centrifugals with 1,700 g.p.m. capacity installed, and the shaft finally recovered to a point 100 ft. below the 2,400 level.

At a point 80 ft. below 2,400 a pressure air lift had been installed just before the shaft was lost. When the pump in the bottom failed, the pressure lift was supposed to keep the water from coming any higher, but a faulty check valve put it out of commission. After getting back down to the bottom, this pressure lift was repaired and is now available for emergencies. A pressure air lift, it might be said, is nothing more than a closed tank suitably connected to an open surge tank and attached to a water column. In operation, it works exactly like an ordinary rock-drill water-supply tank, being alternately filled from the surge tank and emptied by com-

pressed air into the water column. It is an inefficient pumping unit, but is useful for emergency service. This particular one pumps 600 gals. 80 ft. in 12 sec.

At this writing the shaft is within a few feet of the 2,600 level, and with present equipment no further trouble is anticipated. The shaft is entering a more solid granite formation. Not over 500 g.p.m. is flowing from the bottom. The balance, some 300 g.p.m., is coming from the fissures cut above. Some of this is diverted by launders before it reaches the bottom.

On the 2,600 level a large pump station will be cut with well-arranged pump sumps. The shaft will be 25 ft. or more deeper than the level floor to allow for skip pockets and provision will be made to allow flushing out the sumps through a drill hole into a skip.

The pumps for the station have been delivered. The first installation will consist of four 900-g.p.m. four-stage 650-ft. head Manistee H-4 "Roturbo" pumps. Two of these will be connected to a 400-hp. wound rotor motor—one on each end. The others will be connected to 200-hp. motors, making a connected load of 800 hp.

There will be a considerable improvement in pipe arrangement over previous local installations. All pipe lines, including shaft water column, will be of welded construction with fabricated long radius elbows and other fittings. The connecting pieces from pump discharges to header will have a "wye" connection rather than 90° connection as formerly used. These improvements will cut frictional losses. A portable arc-welding machine is used in making the joints in the shaft, as well as on the station.

The usual bulkheads will be installed in the main crosscuts. Some change in design has been made, however. The old type which is shown in the sketch has the reinforcements on the water side of the door, and under pressure the rivets are in tension. To correct this, the new doors will have the reinforcements on the station side. This necessitates some change in the bulkhead to allow clearance for the reinforcements.

At the Portland mine very little difficulty was experienced in shaft sinking.

Cameron sinker pumps were used to handle the water in every case so far as the writer's information indicates. The last station pumps at the Portland were five-stage Lecourtey pumps with 1,000 g.p.m. capacity and 1,010-ft. head, used on the 3,000-ft. level, and three-stage 300-ft. head pumps of the same make used on the winze level which was sunk some 150 ft. from the 3,000 level. These pumps were not used to capacity except for short intervals.

A precaution which has never been considered necessary since was the installation on surface of a 200-kw. steam turbine driven generator for emergency service in case of power failure. After a test run, it was never used again.

Other pumping operations in the district have been smaller and do not present any problems of particular interest.

Pumping costs vary considerably. Continuous records of pump discharges were not kept at any mine except the Cresson, and costs per gallon must therefore be approximations based on occasional measurements in all other cases. Table II gives comparative costs.

In analyzing the pumping costs, the following items should be considered:

(a) No equipment or installation costs are included. The Cresson costs for 1927 include purchase price of replacement pumps.

(b) The cost of pumping during shaft sinking operations is not considered. Mine records here do not show what part of the shaft costs were chargeable to pumping. It is difficult to distribute these costs accurately. The estimated charge for air for shaft pumping at the Ajax mine in February, March, and April, 1937, was \$1,211.78, \$604.23, and \$578.57, respectively. After air-operated centrifugal pumps were discarded, the electric power costs chargeable to the shaft increased approximately \$300 per month. This shows roughly the cost difference. When the figures on the last several months are available, the power costs will be more, but the cost of air to pump the same load would be out of sight.

(c) Labor costs on small installations are higher in proportion to the power and repair costs. The cost of attendance is nearly the same for small and large installations.

(Concluded on page 70)

TABLE II.—PUMPING COSTS, CRIPPLE CREEK MINING DISTRICT, COLORADO

Mine	Date	Period	Head, ft.	Flow, g.p.m.	Power rate, per kw.h.	Costs			Per 1,000 gals., Power	Cost per 1,000 gals., Total	Overall efficiency	Remarks	
						Power, per mo.	Supplies, per mo.	Labor, per mo.					
Portland.	1927-28	2 yrs.	1,000	800	.0111	\$1,818.00	\$103.60	\$646.00	\$2,567.60	\$0.0525	\$0.0764	\$0.00764	....
Portland.	1937	2 mos.	150	400	.0111	216.00	.....	.....	216.00	0.0321	0.0321	0.02119	....
Cresson..	1927	1 yr.	381	4,700	.0111	3,962.67	352.91	723.52	5,039.10	0.0195	0.0248	0.00650	59%
Cresson..	1936-37	8 mos.	125	1,860	.007	1,040.32	.....	.....	1,040.32	0.0129	0.0129	0.01032	19%
Ajax	1935	1 mo.	151	1,200	.0111	694.00	30.00	485.82	1,209.82	0.0134	0.0168	0.01109	....
Ajax	1936	7 mos.	380	3,000	.007	2,472.00	94.00	509.00	3,075.00	0.0190	0.0204	0.00534	....

Power purchased from Southern Colorado Power Company.

Pumping rate prior to 1936: \$0.0111 per kw.h. up to 250,000 kw.h. per month. \$0.009 per kw.h. over 250,000 kw.h. per month.

Pumping rate since 1936: \$0.007 per kw.h.

Additional charge of \$1.10 per hp. per month demand up to 500 hp.; .90 per hp. per month demand over 500 hp.

Activities of the United States Geological Survey Relating To Metal Mining

PRESENTATION of an adequate review of all current activities of the United States Geological Survey relating to metal mining lies beyond the scope of this relatively brief paper. Such a description would necessarily include as perhaps the most directly related phase the present field programs of those sections in the Geologic Branch of the Survey dealing with metals; but to cover other activities more or less closely related to metals, mention would have to be made of certain current projects of the Topographic Branch, the Alaskan Branch, and the Water Resources Branch, and the work of the Mining and Mineral Classification Divisions of the Conservation Branch.

Assuming, however, that the most active interest of the metal mining industry usually attaches to work which is of the most direct aid in locating new ore deposits or in extending those previously known, discussion will be confined to current and recent field work which is being or has been done recently by geologic parties in areas known or thought to be favorable for the occurrence of ore deposits.

One of the major objectives which the Survey has constantly aimed at is to be able to answer with fair decisiveness the question: "What is the future of mining in the United States?" It is probably safe to say that this question will never be answered conclusively, but certainly as more and more data are collected definite features will begin to take form which should permit an ever more accurate appraisal of the situation. For some time, too, general emphasis has been placed on regional structural studies between districts in an endeavor to discover why ore deposits of the respective districts are where they are. It is hoped these broad studies will prove useful in outlining favorable and unfavorable areas for future discoveries. With these general objectives, work is constantly going forward in the field as rapidly as appropriations will permit.

In determining the specific projects to be undertaken, primary consideration is always given to the matter of probable practical results which might accrue from the study. During recent years, however, an additional item has been influential in determination of projects—namely, the offers made by various State surveys or bureaus to undertake co-

operative work whereby a considerable part of the expense involved is borne by the cooperating agency. These agreements have been particularly helpful during depression years, with concomitant cuts in appropriations, in maintaining a very substantial field program which has resulted in reports that should prove of value to the metal mining industry.

As the science of geology has progressed, investigators have learned that their studies must include more and yet more details if they are to attempt to work out the origin of ore deposits and to indicate thereby favorable areas for extensions or additional ore bodies. It has been demonstrated that much of the early work, though really classic in nature, has merited restudy in the light of new scientific thought. Furthermore, as mining has progressed, infinitely more facts have been made available to throw further light on the problems. In short, modern requirements call for so much more detailed work and closer correlation of many geologic features with mining problems, that comprehensive studies require longer time to complete than in the earlier days.

At present, as in the past, field parties are naturally concentrated in the western States, although other districts have come in for their rightful share.

WESTERN STATES

Arizona.—A completely Federal project has been undertaken in southeastern

Arizona by James Gilluly which covers an area extending from Bisbee to the north end of the Dragoon Range, and includes the mining districts of Gleeson, Courtland, Black Diamond, and Pearce. Bisbee is not included in the detailed study. A preliminary report was prepared many years ago by Ransome on the Courtland district; and the Arizona Bureau of Mines has recently released a report by E. D. Wilson on the Courtland-Gleeson region. The present study, which is mainly surface work but with underground data included in the mining districts, is aimed at (1) a more definite correlation of acidic intrusives of several different ages throughout the area in an attempt to determine the age or ages of the one or ones that are mineral bearing; and (2) an analysis of the detailed structure of the region in relation to the mining districts, in the hope that such a correlation may yield valuable clues in outlining favorable and unfavorable areas for prospecting. Copper and minor amounts of silver and zinc are the principal metals involved in this area. One field season has already been spent in the region, and it is expected that at least one more year will be required for completion of the project.

Elsewhere in Arizona a cooperative study is under way between the Arizona Bureau of Mines and the U. S. G. S. which comprises a detailed study of the underground geology at Tombstone. B. S. Butler and E. D. Wilson are pursuing the work which has as its main objective



Prospector's camp near Old Dad Mountain in the heart of the Mojave Desert.

a subdivision of the rock sequence found in the area in order that more detailed mapping may be possible. Although the work is mainly underground, surface features are included to a minor extent, and Gilluly has contributed to the latter phase of the study. It is expected that a preliminary report by the Arizona Bureau of Mines will be released this Fall, and that a detailed report by the U. S. G. S. will appear later.

Colorado.—Recent studies in Colorado, some of which are still continuing, have centered in five different areas: (1) the San Juan region; (2) the Cripple Creek district, (3) the Front Range, (4) the Mosquito Range, and (5) the Snow Mass region.

Work in the San Juan region by W. S. Burbank has been in progress since 1929, and still continues. The work is being done by the Geological Survey in cooperation with the State of Colorado and the Colorado Metal Mining Fund, and it comprises a restudy of essentially the same area covered some time ago on a smaller scale and much more rapidly by Cross. Both surface and underground features are included, and naturally a wealth of new data regarding the latter have been made available since the earlier work. The principal metals involved are gold and silver, with some zinc, lead, and copper. Structural and stratigraphic features of the whole area have been worked out in great detail, and the study affords a general systematic setting for future development in the entire region. Preliminary reports on the work appeared in Proceedings of the Colorado Scientific Society (Vol. 12, No. 6, and Vol. 13, No. 5), and the final report on the Ouray district is now almost completed.

A detailed restudy of the Cripple Creek district by Loughlin and Koschman has been under way for several years, and is now nearing completion. The resurvey, dominantly underground, was decided upon after Loughlin visited the district in 1924 and 1925. Developments at depth in the Portland and Cresson mines suggested that the original conclusions of Lindgren and Ransome might be subject to some modification. Subsequent work in the district has proved that (1) there is a very marked structural control of the veins and ore shoots; (2) the telluride ores, although regarded as epithermal, have continued down to depths of 3,000 feet or more without noteworthy change other than that the ore shoots, for structural reasons, are fewer at depth and are restricted to master fissure zones; and (3) the crater, although essentially covering a continuous area on the surface, splits downward into a number of roots or sub-craters, some of which extend far below the deepest mine workings, whereas others are comparatively shallow. Many of the detailed results of the work were published in Vol. 13,



Kokomo district, Colorado.

No. 6 of the Proceedings of the Colorado Scientific Society. Koschman has made some final check-ups during the summers of 1936 and 1937, and the present expectation is to prepare a composite mine map of the entire district, somewhat similar to that of Lindgren and Ransome in Professional Paper 54, but with much more detail because of the greater amount of mine workings now accessible. Furthermore, it is intended to show the veins and ore shoots and their relations to structural features, rather than just the mine workings.

Extensive work has been pursued in the Front Range since 1926 by T. S. Lovering and E. N. Goddard. Parts of the areas studied had been covered by earlier work, but the entire region had never been coordinated by a comprehensive project with economic ends in view. Surface features were emphasized, although detailed geology revealed in underground workings in mining districts were tied into the complete picture. Two Professional Papers have been published recently embodying much of this work—one on the Breckenridge dis-

now engaged on a similar study of the Gold Hill district.

Professional Paper 148 on the Leadville district demonstrated that a great deal could yet be learned of practical aspects of the stratigraphy and structure of the Mosquito Range; and in recent years Butler, Singewald and Behre have been engaged in comprehensive study of various districts in this general region, the results of much of which have already appeared in the Proceedings of the Colorado Scientific Society (Vol. 12, Nos. 3, 10, and 12; and Vol. 13, No. 4). Additional reports on this area to be published soon by the Survey comprise "Mines in the Vicinity of the London Fault"; and a detailed geologic map of the area surrounding the Weston Pass district, with brief explanatory text. No work is being done in the region at present, although F. G. Wells spent the 1936 season in the Kokomo-Robinson area, but the field work is not completed.

A report by J. W. Vanderwilt on the Snow Mass region, in the Elk Mountain range southwest of Glenwood Springs, is now in press.

Idaho.—Several important projects in Idaho are now being conducted in cooperation with the Idaho Bureau of Mines and Geology, including the Coeur d'Alene district, the placers of the central part of the State, and Kootenai county.

The ore deposits of the Coeur d'Alene received early extensive study by Ransome and Calkins, and their report was issued in 1908. Later the mines were restudied by Umpleby and Jones, as the result of which Bulletin 732 was published in 1923. Recent developments in the Dry Belt in the southwestern part of the district, which contains the Sunshine, Polaris, Crescent, and other mines, have led to a comprehensive review of the surface as well as the underground geology, and P. J. Shenon is now spending his second year in residence in the district. By closer study of the stratigraphic section, Shenon hopes to subdivide it into more units and thereby reveal the structural relations of the veins more accurately than was possible earlier.

Another comprehensive program of work in Idaho is concerned with the placers of the central part of the state. During the past five years several placer districts have been closely studied, including Warren, Florence, and others. This work has shown that the placers lie along the streams of an ancient drainage system that has been greatly changed by recent uplift, and modified by glaciation during several periods. It has seemed desirable, therefore, to undertake a comprehensive study of the physiographic development of central Idaho which, it is hoped, will permit a more accurate appraisal of the unproven placer areas. This work will be done by S. R. Capps, who has been



U. S. G. S. camp at Concord, Idaho.

trict and one on the Montezuma Quadrangle—and additional details have appeared in Proceedings of the Colorado Scientific Society (Vol. 12, Nos. 4 and 7). A geologic map of the Front Range, showing detailed structural features in a highly complex area, is now finished and will be published as soon as possible with a brief accompanying text. The final report on the geology and ore deposits of the Front Range is in process of preparation. Goddard has completed a report on the Jamestown district, and is



Town of Gold Hill from Crown Point Mine on the Comstock Lode, Nevada.

engaged in similar work in Alaska for more than 25 years.

In response to strong local appeal, the mines and prospects of Kootenai county are being studied this summer by A. L. Anderson of the University of Idaho.

Nevada.—The recent revival of prospecting and mining at Austin, Nev., has led to insistent local requests for a study of that area. The district, known earlier as the Reese River, has a production record of about \$50,000,000, largely in silver. A brief report on the district by J. M. Hill was published in Bulletin 594 in 1915. It is being re-examined this season by C. P. Ross, and a topographic base will be prepared by Dietz. In order to determine whether certain geophysical methods may aid in revealing the presence of obscure veins, Stevenson, of the geophysical section, will be assigned to survey several small areas that will be chosen by C. P. Ross.

The silver-gold deposits of the Comstock Lode were described by Becker in 1882, soon after the exhaustion of the Big Bonanza. Little geological work was done thereafter until 1932 when V. P. Gianella, of the University of Nevada, began a study of the southern end of the lode. His report was published in 1937 as a bulletin of the University of Nevada. In 1935 the Geological Survey completed a new topographical map of the district, and F. C. Calkins and W. D. Johnston, Jr., of the Survey, began geological field work. During the summers of 1935 and 1936 Calkins, assisted by T. P. Thayer, mapped the surface geology, and Johnston and Gianella mapped the geology of the accessible underground workings and studied the ore deposits. A Professional Paper on the district is now in preparation, and a black and white preliminary edition of the new geological map, which differs in many details from the earlier one of Becker, will probably be published in the

near future by the University of Nevada. A new mine map, compiled from all available working maps, will be published with the final report.

New Mexico.—Another cooperative project is that which concerns the Hatchet Mountains area in New Mexico. S. J. Lasky has recently completed a report on the geology and ore deposits of the Little Hatchet Mountains in cooperation with the New Mexico Bureau of Mines and Geology. The nearby Hatchet Mountains constitute a larger and more complex area. A topographic map has been prepared of this region, and work on the geology will be started this fall.

Utah.—The alunite deposits of the Marysvale region in central Utah were found before the World War, and were vigorously exploited during the war for the contained potash. Since the residues from the alunite constitute a potential source of aluminum after potash has been extracted, interest in the resources of the region has increased greatly in recent years. Topographic mapping was begun several years ago, and at present the second of the two 15-minute sheets is approaching completion. Study of the geology and mineral deposits was begun in 1936 by Eugene Callaghan, and it is hoped may be completed this season. In addition to the numerous alunite areas, there are also the Annie Laurie and other gold deposits.

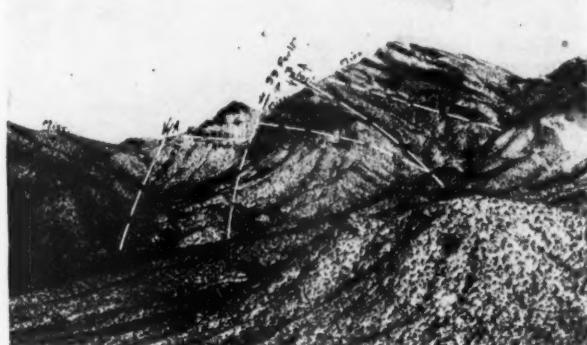
In 1935 and 1936 Francis G. Wells of the U. S. Geological Survey made a survey of the Bull Valley iron ore area in southwestern Utah. It is the first detailed study of this area and the results will be of value to the iron industry of the West, as the blast furnace at Provo, Utah, has been drawing its supplies from the Desert Mound and Iron Mountain deposits of the Iron Springs district some 20 miles northeast of Bull Valley. A report to be published by the U. S. Geological Survey is in preparation.

Washington.—The recent development of several very promising zinc mines near Metaline Falls, Wash., has led to a request for a comprehensive study of the geology and ore deposits of a large area in northeastern Washington. The new topographic map of the Metaline Falls quadrangle, on the scale of 1 to 125,000, covers about 800 square miles and includes several extensive belts of limestone in which the zinc deposits are



Above—Taking notes underground at Virginia City, Nevada.

Right—Complex structure in Spring Mountains, Nevada.



found. The survey of the mines and geologic mapping of the quadrangle were begun in 1936 by C. F. Park, Jr., and it is hoped will be completed this season.

Boulder Dam Area.—A resume of current metalliferous work in the west is not complete without at least a brief reference to the recent report "Mineral Resources of the Region Around Boulder Dam," Bulletin 871, by D. F. Hewett and others. Several years ago there were urgent requests to summarize knowledge of mineral resources in that area, the development and processing of which might utilize some of the huge supplies of cheap power which has since been made available by completion of the dam. Extensive field studies were made, and the report gives a concise description of the mineral potentialities of the area lying within 200 miles of the dam, covering parts of Arizona, California, Nevada, and Utah.

CENTRAL AND EASTERN STATES

Most of the current and recent work in the central and eastern states relating to metal mining is concerned with the lead-zinc deposits of the Tri-State district, and iron and manganese deposits of Alabama, Georgia, and Texas. Closely related with metals, however, are the bauxite deposits of Arkansas, to which brief reference will be made.

Alabama.—Studies have been made during the past three years of the brown iron ore deposits of the Russelville district (near Muscle Shoals), the Birmingham district, and in eastern Alabama by E. F. Burchard and assistants, some of which were carried out under allotments from the Public Works Administration. A report on the Russelville area is now in preparation, and advance data on this district and on the eastern Alabama area will be released some time this year.

Several manganese deposits, particularly those near Oneonta, Walnut Grove, and Rock Run, were examined by E. F. Burchard and T. G. Andrews in 1935 and 1936. Results of this work will be embodied in a cooperative report on the manganese ores of Alabama, which the Geological Survey of Alabama hopes to publish.

Arkansas.—Under allotments from the Public Works Administration a restudy was made in 1934 and 1935 of certain aspects of the bauxite deposits in Pulaski and Saline counties under the supervision of M. N. Bramlette of the Survey. The results gave a substantial basis for outlining the more prominent syenite areas (from which the bauxite is derived by weathering), and for limiting the depth of testing for possible deposits. The study further indicated that there is little prospect of any large undiscovered area of importance beneath the surface between the two known areas associated with syenite rocks in these two counties. A report by Bramlette on this work was issued in 1936 as Information Circular 8 of the Arkansas Geological Survey.

Georgia.—The geology and mineral resources of the Cartersville district,



Mapping at Baker Hill Mine near Tecumseh Station, Ala.

Ga., begun by Mr. T. L. Kesler of the Geological Survey in November, 1936, is being continued in 1937. A detailed geologic map will be made of the Pine Log quadrangle, and studies will be made of the deposits of manganese ore, ocher, limonite, and barite which characterize this area. The problem is one dominantly of surface geology and mining, although there may be a few shaft mines involved in the study. The work is purely a project of the U. S. Geological Survey which will probably publish the report as a bulletin sometime within the next year or two.

Missouri-Kansas-Oklahoma.—There have been several comprehensive studies of the zinc and lead deposits of the Tri-State field, both by the Federal Survey and by the bureaus of each of the states in which they occur,—Missouri, Kansas and Oklahoma. Funds allotted by the Public Works Administration permitted the initiation of the present project in 1933, and it will continue another year or possibly longer. E. T. McKnight is the geologist in charge of the project and he will reside in the region until the project is completed. In recent years work has shown that by close study of the beds that make up the section in this field, it is possible to identify numerous fractures, shear zones, faults and folds, some of which appear to control the distribution of the ore deposits. Most of these beds may be recognized in each mine and some can be identified in drill holes remote from mine workings. The program of field work includes study of all of the mines and examination of cuttings from hundreds of exploratory drill holes, and one of the products will be a detailed structure contour map on a key horizon. This should be useful in guiding exploration for ore bodies.

Texas.—A detailed survey of brown iron ore deposits in about 20 counties was made under Public Works Administration auspices in 1934 by E. B. Eckel of the U. S. Geological Survey. The work has resulted in better knowledge of the character of the ore, and in the most accurate estimate of reserves that has yet been made. The number of

counties in which commercial deposits of ore are present has been materially reduced in comparison with former expectations. As established by these studies, the reserves amount to about 200,000,000 tons, which is ample for many years to come, but is not so large as some earlier guesses as to tonnage.

An information circular and a preliminary report on the iron ores of eastern Texas by E. B. Eckel have both been published by the University of Texas Bureau of Economic Geology, and the complete report has been written and is being prepared for publication by the U. S. Geological Survey.

Work of Bureau of Mines

(Continued from page 55)

ated is the detailed record of output being accumulated on our metal mining districts. Such records are an invaluable aid to geologists directing search for new deposits in the older areas. This accumulated knowledge will increase in value as time goes on because exhaustion of our higher grade deposits will force us to reexamine previously abandoned areas for lower grade ores. The increase in the price of gold has stimulated this type of prospecting and the Bureau's records of district production have been helpful in indicating the most promising areas for search.

It is sometimes stated by uninformed critics that the Bureau's statistical work duplicates the services rendered by privately operated trade organizations. Careful investigation, however, clearly demonstrates that this is not so. As a matter of fact it is the policy of the Bureau not to duplicate current statistical surveys adequately conducted by private organizations. Most of the Bureau's work in the field of weekly, monthly or quarterly statistics is done in cooperation with or at the request of trade agencies. There does appear to be some overlap in the field of annual statistics, but in most cases the points of view of government and trade organizations differ considerably, so that in effect there is very little duplication. Moreover, public interest demands and the law requires that the Bureau maintain a complete and uninterrupted statistical record of mineral production.

I wish again to express the Bureau's sincere appreciation of the effective work which has been done on its behalf by the American Mining Congress.

The needs of the mining industry have not generally been given the same degree of consideration by Congress as have the requirements of agriculture. Our Federal taxes and our contributions to the wealth of the nation constitute compelling reasons for the remedying of this situation. The Mining Congress has done great work in emphasizing our needs in Washington. It offers an excellent organization through which mining people may take concerted action to improve our public relations and build up a stronger position of influence in the nation.

Sectionalizing Power by Automatic Circuit Breakers

By JOHN T. PARKER *

AN IMPORTANT factor in the efficient operation of a mine is a continuous power supply. Therefore interruptions due to power failure should be reduced to a minimum and steps taken to confine those which do occur to a limited area of the mine.

At the Wheelwright mine of the Inland Steel Company, 20 automatic reclosing circuit breakers make it possible to operate under some rather severe conditions with few delays due to interruptions on the d.c. power distribution system. The mine operates in the Big Sandy-Elkhorn district of northeastern Kentucky and at the present time is producing about 5,300 tons per day from a seam that averages but 45 in. in thickness. The mine workings are spread over an area of approximately 15 sq. miles. The underground power distribution system is extensive and due to some very bad roof conditions could be responsible for many serious delays in operation. Power is purchased from the Kentucky-West Virginia Power Company and is metered at one station. From the central metering station power is transmitted at 40,000 volts over our own lines to the various substations, and at the present time we have in service approximately five and one-half miles of high tension line.

The 250 volt d.c. power distribution system centers about five substations, and both motor generator sets and rotary converters are utilized in this service. These five substations have a total installed capacity of 1,300 kw. of which 950 kw. is in constant service, the remaining 350 kw. being used for "standby" service. The stations operate in parallel and are connected inside the mine by 500,000, 800,000, and 1,000,000 circular mill cables and 6/0 trolley wire. The distance between stations varies from 1½ to 2 miles. Two of the substations have full automatic control while the other three stations are semi-automatic, being equipped with auto-

matic reclosing breakers on the d.c. end. All units have thermal bearing protection and are equipped with reverse current relays.

Beginning with a substation installed near the main drift mouth where one 200 kw. M. G. set operates, the remaining four are located near the load centers of active mining areas. The load on the 200 kw. unit at the main drift mouth is made up almost entirely of main line haulage equipment. The principal mine load consists of three 15-ton and one 10-ton haulage locomotives, 26 6-ton gathering locomotives, 25 shortwall mining machines, and 54 pumps. These pump motors are of small capacity, 98 percent being of 7½ or less hp. The average distance from the side tracks to tipple is more than 2 miles.

The mine load is distributed over the 24-hour period of the day which permits substantial savings in power costs as well as the efficient use of equipment. A multiple shift is worked underground with shifts starting to work at 7.30 a. m., 3.30 p. m., 4.30 p. m., and at 9 p. m.; the cutting and loading operations are performed on opposite shifts. The tipple operates 17 hours each day and has a wired in a.c. load of 672 hp. The total wired in load for the plant is 5,288 kw., and the power demand is averaging



Headhouse conveyor and tipple at Wheelwright.

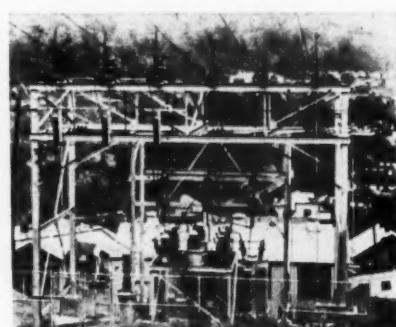
about 1,350 kw. with unity power factor.

When the Wheelwright operation was first sectionalized with automatic breakers in 1931, only ten breakers were required to effectively block off the various load areas. At that time there were two mines, each having its own headhouse with coal conveyed to a common tipple on a belt conveyor, and the total production was approximately 2,500 tons daily.

As the mine developed and production was stepped up, new plans were put into effect. The two mines were consolidated, and now all coal is brought to a new steel tipple. The cars are dumped by a two-car rotary dump, and the mine car turnover is now more than three times a day. The coal is carried to the tipple by a flight conveyor, and a 2,800-ft. continuous aerial tram is used for refuse disposal.

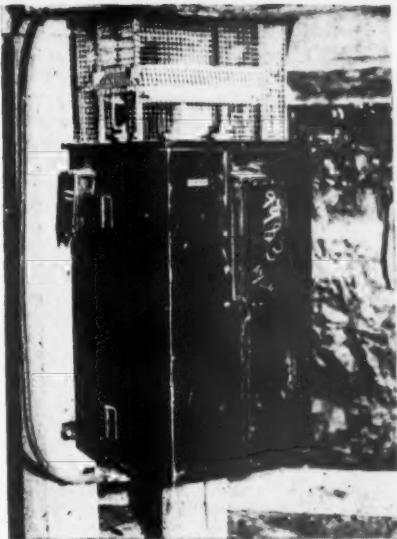
New equipment was added as this expanding process continued; and in the next few years ten additional breakers were installed, making a total of 20 units in service. All of these breakers are of the same manufacture and have the same current rating. The overload tripping range is from 400 to 1,600 amperes, and all parts are interchangeable. During the period the breakers have been in service at Wheelwright the average monthly maintenance cost for material has been insignificant amounting to only 32 cents per breaker.

Our method of installing the breakers is simple. Whenever possible we locate the breaker on the wire side in the mouth of an old breakthru. Using two sawed timbers measuring 4-in. by 6-in. of the necessary length, and wedging



Rear view of the substation near the main entry.

* Superintendent, Inland Steel Co., Inc.
† Presented to Coal Convention, American Mining Congress, Cincinnati, Ohio, May 17, 1937.



The circuit breakers are relocated from time to time.

them firmly, the breakers are attached to these timbers by the use of lag screws. The breaker comes from the manufacturer equipped with lugs for this type of installation. In case it is not practical to use a breakthru for the installation, a place 5-ft. by 5-ft. is cut in the coal, and the necessary height made by shooting top.

We have never erected special enclosures for the breakers as they come enclosed in a steel cabinet which we feel gives ample protection if the breakers are properly located. Of course a fire proof enclosure would be additional protection in case of the unit itself becoming defective and going to ground, but the steel cabinet would properly confine such a fire. After the installations are completed, the breakers are set at predetermined values and locked. Locking the units prevents any unauthorized person tampering with the breaker settings.

A definite plan has been followed in locating the breakers; and while it has not always been possible to adhere to it exactly, it has been carried out where possible. The plan in mind was one that would sectionalize the main haulage and feeder circuits from the switchboards of the substations by circuit breakers placed in the circuit between stations. With this plan in effect a short circuit or overload can cover only a limited area and cannot affect more than one substation.

In a distribution system as large as the one at Wheelwright and where substations are feeding from several points, it appears to be wise to locate breakers between stations. Overload settings need not be so high since the breakers only handle exchange current, and due to low overload settings the breakers are very sensitive to disturbances and open readily. Without tie breakers between stations many of the sectionalizing benefits may be lost. For example, a short circuit, or overload on any section of the

circuit that is controlled by a substation switchboard breaker and sectionalized by a tie breaker beyond would open both switchboard and tie breakers, completely disconnecting the disturbed area from the system.

This action prevents a condition arising which frequently causes much loss of time where tie breakers are not installed. Where tie breakers are not used, the short circuit in question would open the nearest substation breaker; but due to heavy line resistance might not open breakers at distant substations where the breaker setting would normally be high. The overload, or ground, causing the disturbance would continue to be fed from these other substations; and if it happened that the over-load was due to the trolley wire being in contact with a rail or metal part of a mine car, a dan-

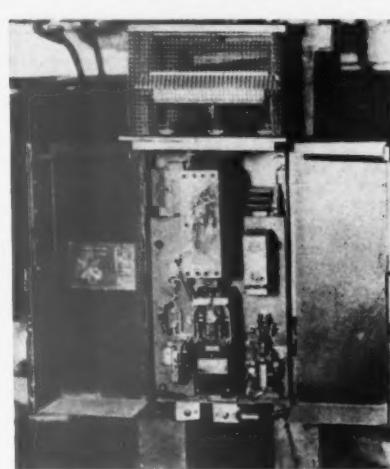
gerous fire hazard would exist. While the possibility of igniting bituminous coal by an over-heated wire is remote, according to the Bureau of Mines (Hazard of igniting coal by electrical circuits in mines: Technical Paper No. 568) it is possible that if the over-heated wire is in contact with combustible material such as timbers, ties, or a door, a fire would result.

Also on a section where power is fed from a distant source it is frequently difficult to get a near-by substation back on the line as the equipment on the section can still secure some current, controllers are advanced; and when the nearby station breaker does reclose, it opens immediately on an overload. Before the load can again be properly absorbed by the system much delay occurs due to the circuit interruptions at the nearest substation. We feel that the placing of the breakers in the tie lines between stations eliminates entirely the possibility of feeding high resistance grounds and overloads from distant sources and also creates better line conditions for the breaker to operate by permitting more sensitive overload settings.

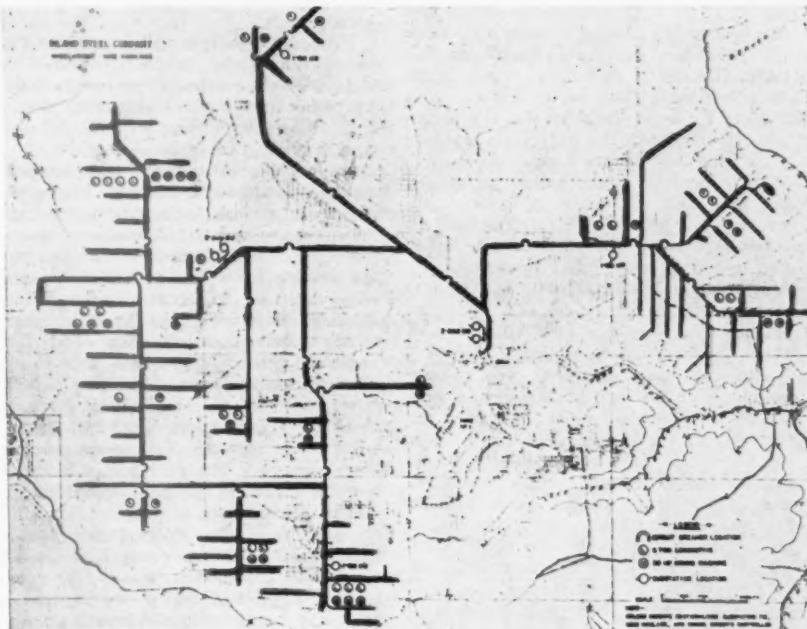
The plan which is followed in sectionalizing the active mine sections is to locate each breaker so that a disturbance occurring on the section which it controls will not cause an interruption at a substation breaker. Twenty-six locomotives and 25 mining machines are used at the Wheelwright operation, and we have been able to isolate them to the extent that only three gathering locomotives on one shift and three mining machines on the opposite shift are working directly on a substation breaker.

No attempt is made to limit the load on a section so long as it does not exceed

(Concluded on page 70)



One of the sectionalizing units between substations.



Mine plan showing substations and circuit breakers.

The LUBRICATION of COAL CUTTING and LOADING MACHINERY

By CHARLES W. FREY and F. M. HOFERER *

THE increased demand for coal, calling for accelerated production, has had the same effect on the mining industry that a similar problem has had on all the heavier industries in this country. In all cases the answer has been the same: increased mechanization and the installation of machines which can do the work of several manual workers, and do it better and faster.

The general public, it would seem, is not aware of the great use to which machinery is put in underground workings. While they may know that such things as production lines exist in the automobile industry, they still have, in many cases, the idea that coal is worked by hand, that children not yet in their teens work endlessly with shovels to dig out the coal far beneath the surface of the earth, and that mules who never see the light of day spend their lives dragging little cars around.

The mine operator knows that such conditions cannot exist today, not only from a humanitarian viewpoint, but also when figured on a pure dollars and cents basis. If he is to meet competition, and to produce his coal at a lower cost than his neighbor, he must mechanize his mine. He must, and does, invest large sums of money in costly cutters and loaders in order to save the few cents per ton that spell the difference between profit and loss in his business.

Unfortunately, when he has purchased his new and expensive equipment his worries are not completely finished. A machine cannot run or maintain itself, and unless it has proper operation and service its maintenance costs will mount, repairs will become necessary, and that old bugaboo, cost per ton, will rise and stare him in the face again.

His two main weapons are proper maintenance and proper lubrication, and the one is dependent upon the other. He may supply the service department with the finest oils and greases in the world, but unless they apply them properly, and in the right places, they will be useless. On the other hand, the finest mechanics in the world can do little if a short sighted policy has been followed in purchasing, recommending, and applying lubricants. The proper combination of the two will insure that the

expensive cutters and loaders will live to a useful old age, and many problems will be overcome.

Let us consider the nature of these problems. In general we may say that the greatest trouble is the conditions under which the machines have to operate, and these are no fault of the operator. Water and dust, which exist in every coal mining operation, are foes of all machinery. Mine water, with its high acidity, corrodes metal, eats away electrical insulation, and makes its unwanted presence known in many disagreeable ways. Bug dust is also always present around cutting and loading operations, sifting into bearings and gear cases, piling up on cutter chains, ruining bearing surfaces and reducing clearances until ultimate breakdown occurs.

Proper lubrication will do a great deal to prevent these troubles. Water resistant greases will stay in bearings and not wash away, while a bearing that is full of grease offers no admission to dust with its abrasive action.

In addition to water and dirt, conditions are also encountered where the operators are at fault. In many cases maintenance is poor. A tendency to run machines until break-down occurs is responsible for a great deal of unnecessary expense. Friction clutches which are not oiled until they heat up, gears which receive no lubricant until they begin to growl—these are the things which ultimately cause costly breakdown, for in a complicated piece of machinery such as a longwall cutter, when one part carries away, several more are very liable to go. When this has been caused by poor maintenance, which includes lack of proper lubricants, the expense and trouble are inexcusable.

In addition to the general, there are many specific problems which may cause trouble, not all of which can be greatly helped by even the best of lubricants and lubrication. In the past, when mechanical mining was just getting its start,

there were some faults in machinery design. Fortunately this condition has practically disappeared in the newer machinery, but many older models still exist and the problems of faulty construction exist with them.

In the first place the early machines were often greatly overloaded. Cutters were built with motors of insufficient capacity to stand the shocks of hard seams and impurities, loaders were expected to load and tram at the same time, with a motor hardly sufficient for the loading operation alone. Luckily the machinery manufacturers were quick to recognize this and in general have furnished later models with motors of proper horsepower.

In older types of machinery, one lubricant has had to do several jobs. Most automobile operators know that they need a different type of oil for the transmission and differential gears and for the crankshaft bearings, but many cutters and loaders, and especially cutters are so built that one lubricant must serve for gears, bearings, and friction clutches as well. Clearly any lubricant that can serve three entirely different machine elements must necessarily be a compromise. The oil companies, however, have been able to produce lubricants which can meet this situation ably and well. An additional fault in many old machines is that of faulty oil seals, so that leaks are inevitable. No wonder the mine operator hesitates to use quality lubricants, when he sees them running out almost as fast as he puts them in. If he is going to pour oil away, he feels that he might as well waste "black strap." Needless to say, this is not the proper solution, no matter how logical it may seem to the operator, because "black strap" was never intended as a lubricant for highly finished gears or clutches.

There is also apparent a seeming disregard for lubrication fundamentals from a maintenance viewpoint, and here all interests may be held at fault: the

* Standard Oil Company of New Jersey.

operator, the manufacturer, and the oil company. The mine operator is too busy to stand by and see that the proper lubricant is put in the proper place, and the oiler will make mistakes if he is not carefully instructed. To him "oil is oil," he does not realize the differences in quality which make one oil adequate for gear cases but wholly unsuited for ring-oiled armature bearings, so he uses one where the other belongs and the ultimate result is tragic.

As an example of the troubles that can be caused by improper lubrication, the authors were shown three clutch discs which had run so hot that they were welded together at one point so thoroughly that they could not be broken apart by hand. Furthermore, the rim of the center disc had stripped and piled up in a compact mass at one point on the circumference. All three discs had turned blue from heat. Although the operator claimed that oil had been present in the clutch housing at the time, the unanimous opinion among those to whom the discs were shown was that they had been run without any oil at all. Needless to say the expense involved in replacing these parts and taking the machine out of operation for repairs was considerably greater than the cost of the oil which should have been used.

The builder is also at fault. He may place a plate on his machine saying "Use Engine Oil," never thinking that there are more types of "Engine Oil" in existence than there are soaps, and that one brand may be no more suitable for the purpose than harsh sand soap is for cleaning silk stockings. But here again the builder is showing progress, as most of them are now doing extensive test work on lubricants to see what can be done toward insuring proper lubrication of their machinery.

Perhaps the oil manufacturer has also been at fault. The fact that the operator does put the wrong lubricants in the wrong place may be due to the fact that nobody ever told him just what to do. The oil salesman must not only provide the proper products; he must give service, he must instruct the users in the proper application, he must be able to spot trouble before it happens and if it is in his realm, correct it. Then, and only then, can he hope to have the customer satisfied with his machine and with the oil which the salesman has sold him.

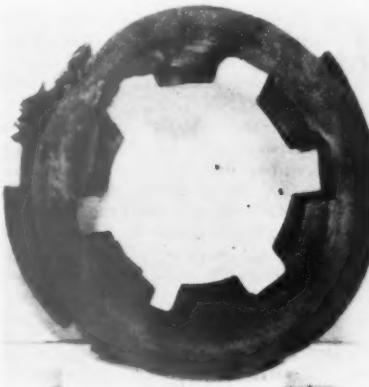
CUTTER LUBRICATION

There are two types of cutters: those which are actually pneumatic drills or hammers, and chain cutters. It is the latter class in which we are interested, and in it are included breast machines, shortwalls, longwalls, shears, slabbers, and saws. In general, they all work on the same principle: cutting teeth are mounted on an endless chain, which is revolved by power transmitted through a gear chain and friction clutches from an electric motor.

The first point of lubrication is the motor armature bearings. There are many old type cutters still in use in

which the armature bearings are waste packed, the waste is kept saturated with oil which is fed by capillary attraction to the bearing. Long strand wool yarn waste is the best for this purpose, and it should be kept well saturated with a medium bodied machine oil of between 275 and 450 seconds Saybolt viscosity at 100° F. Some operators persist in using black oils for this class of work, but because of impurities, usually of an asphaltic nature, present in this class of oils they should not be used. The impurities have a tendency to "glaze" which prevents proper feeding of the oil to the bearing. In many cases a so-called "Liquid Grease" is admirable, especially if the bearings are the least bit worn. Liquid greases suitable for replenishing waste should contain about 95 percent mineral oil (with a viscosity between 200 and 300 seconds Saybolt viscosity at 110° F.) and the remaining percentage should be a soap which will aid in preventing leakage.

Newer cutters have armatures mounted on ball bearings, lubricated with grease. The proper lubrication of ball bearings



Clutch discs welded together due to improper lubrication.

is a science in itself, in which the salient point to remember is *never use too much grease*. Many an oiler, given a grease gun, will proceed to force grease into a fitting until he sees it coming out around the shaft. Such a procedure is often bad in anti-friction bearings, especially on motor armatures. In the first place it may break the grease seal, sooner or later, so that grease will be thrown into the armature windings, rotting the insulation and causing short circuiting. In the second place the balls cannot turn freely in the races if the housing is packed full of grease, and the high internal friction which will be generated by the balls plowing their way around will cause excessive heat, broken retainers, and burned out bearings. The grease should only serve to lubricate the balls, cutting down friction between balls and retainers, and protecting highly polished surfaces from rust and corrosion. To do this the housing should never be more than one-quarter to one-third full, and replenishing once every three months should be sufficient under normal conditions.

The above remarks are borne out by the experiences of the manufacturers who have found when called in on ball-bearing complaints that 90 percent of the ball-bearing failures have been due to overloading the bearing housings with grease. They have been outspoken in their contention that such failures have been no fault of the lubricant and certainly no fault of the manufacturer.

As a general rule a medium-consistency grease having a soda soap base and a mineral oil with a viscosity of about 200 seconds Saybolt at 100° F. should be used for ball bearings. Soda base greases having a short fibre structure resist separation under the churning action of the balls, but they are soluble in water. If water or excessive moisture is present a grease of medium or light consistency made with a lime soap base should be used, observing the same precautions as to filling as mentioned above.

Gears, friction clutches, and their bearings are all contained in the same housing and must therefore be lubricated by the same product. The fact that the clutches must be slipped limits the viscosity of the product to be used, because an oil sufficiently heavy to give proper gear lubrication has too much internal friction for proper clutch operation. The lower limit of the oil viscosity must also be determined by the amount of leakage which is prevalent in most of these machines, because the lighter oils will leak more than the heavier ones. In the majority of cutters now in use it will be found best to use a fluid grease. A light grease insures better protection for the gears and less leakage at the joints.

Several types of machines have clutches which are separated from the gears and require a separate lubricant. In these installations great success has been had using a blend of 50 percent kerosene and 50 percent of a machine oil with a viscosity of approximately 300 seconds Saybolt at 100° F. Such a blend has a sufficiently high lubricating value to allow free motion of the clutch plates and also, because of its high kerosene content, readily conducts heat away from the clutch surfaces.

It has been found by actual experience that the use of too heavy a product, especially soap-thickened oils that are used for bore gears and clutches, will warp the clutch plates and cause the grease to carbonize. The ultimate result will be pitting and scoring of the highly finished clutch plates, breakdown, and costly replacement.

The newer shortwall cutting machines are coming through with sealed gear-cases and ball-bearing shafts which are isolated from the gears. These gears are best lubricated with a heavy oil of approximately 125 seconds Saybolt at 210° F. The bearings are located in a poor position for heat transfer, and will consequently run warm. A high temperature ball-bearing grease, slightly heavier than that recommended for motor armature bearings, and of the soda base type, should be used.

Old breast machines equipped with

open gears, of which there are still many in use, require a special lubricant for the gears. The use of so-called "gear-shield" compounds is poor practice, because they only cause deposits of bug dust to build up with consequent rapid wear of the gears. "Black strap" is not favored for the same reason. The best practice is to flush the gears with a well-refined straight mineral oil having a viscosity of 1,000 to 1,200 seconds Saybolt at 100° F. This type of product is sufficiently light to flush dust and dirt away, yet still has sufficient body to adhere to the metal and give a lubricating film.

Granny boxes require a high melting point soda-base grease of medium consistency.

Hydraulic controls should use, as a hydraulic medium, an oil of between 50 and 65 seconds Saybolt viscosity at 210° F., and the pour point of the oil, especially if the machines are stored outside, should be below the anticipated minimum atmospheric temperature.

Cutter chains present a difficult problem. Great success has been had by using inexpensive machine oils with viscosities between 45 and 50 seconds Saybolt at 210° F. Oils this light will wash dust away and will penetrate between links. They are to be preferred to heavy compounds and greases, which serve as binders for the dust. Chain lubrication with light oils should be frequent and thorough.

LOADER LUBRICATION

Loaders present many problems similar to those found in cutters, but in general they are not as severe. The same recommendations that have been made for motor bearings, chains, and hydraulic systems in cutters apply to loaders, and no more need be said about them.

As a rule highly refined mineral oils with viscosities between 55 and 65 seconds Saybolt at 210° F. are recommended for the gear boxes of cutters. However, in some models, namely, Joy 5 BU's and the older 7 BU's, which have split gear cases, a heavier product must be used to prevent leakage. In those models it will be found best to use a fluid grease of the same characteristics as recommended for cutter gear boxes. The Joy Manufacturing Company recommends that this type product be used in these models. In addition, where leakage is experienced in other models with straight mineral oils, a fluid grease will be found excellent.

It would be poor policy to point out the many causes for failure of mining machinery, or to emphasize the necessity for correct lubrication, without attempting to suggest some method by which the cure can be accomplished. As in most other things, education is the best means of bringing about the desired end.

The first group to whom the information must be brought is the mine owners, operators, and superintendents themselves. If they realize the need for scientific application of lubricants, they can see that the correct procedure is followed. The lubrication salesman, if he

knows his business, can undoubtedly help with his suggestions. He has been trained by his company in his job and he knows that he is supposed to give service, for only by giving service can he benefit both the operator and his own company. If the operator will place his problems before the salesman he can be sure that a solution will be forthcoming, if one is possible.

When the operator has the information he desires, it is his responsibility to see that the men in charge of the machinery heed the directions. A few extra cents spent in hiring an intelligent oiler will often save ten thousand dollars worth of machinery. If the proper oil is used in the proper place, at the proper time, all will be well. But if granny box grease is well stirred with bug dust, and packed into the gear case of a brand new longwall cutter with a dirty stick, trouble will follow.

The manufacturers of mining machinery, as has been mentioned before, have seen the need for proper lubrication, and are taking steps to see that it is provided. Often this takes the form of definite recommendations by brand name. Sometimes this procedure is justified, sometimes not, but at least it is a step toward getting a lubricant into the machine which the manufacturer knows is satisfactory.

The responsibility for correct lubrication is shared also by the oil manufacturers. They are the ones who have to recommend the correct lubricants and assume the responsibility for them. They have reputations to build up and maintain, and these reputations can only be borne through good service and correct products.

Coal Commission Sets Up Classification Standards

Standards of classification for coal were established by the National Bituminous Coal Commission August 16. This step, the Commission believes, will enable it to establish the minimum prices the industry is demanding much sooner than had been expected.

In its order the Commission limited the standards to the chemical, physical and performance characteristics of the coal itself, without reference to market history, uses and other factors which, the Commission determined, will be considered subsequently in setting up the minimum prices and marketing rules for the 10 market areas established by the Guffey-Vinson Act.

In the classification order the standards were set forth as follows:

1. Proximate analyses; namely, moisture, ash, volatile matter, fixed carbon and sulphur, British thermal unit content and ash softening temperature, analyses of ash and ultimate analyses of coal;
2. Physical characteristics;
3. Characteristics of performance.

The order requires the district boards to give due consideration to all necessary and ascertainable information concerning these standards with respect to the various kinds, qualities and sizes of coal

mined and shipped by all code members within the district.

It requires that all coal be classified fairly and equitably as between producers, and as between districts. The classifications will apply to the coals as of the time and place when preparation for market is completed by the producer at the mine or at facilities normally considered mine adjuncts.

All code members are required to furnish information pertinent to this classification on forms supplied by the boards within 10 days of receiving these forms, this information to include the kinds, qualities and sizes produced.

While this information will be available to the Commission upon its request, it will be held confidential by both the Commission and the boards except as necessary in carrying out the provisions of the Act and decisions of the Commission. If any producer fails to supply the information, the district boards are instructed to proceed with the classification of his coals on such information as they may acquire.

The order provides for filing these classifications and for proceedings whereby any producer who believes his coals, or other coals, have been inequitably classified may appeal to the district boards and the Commission for a hearing and a change of classification. There is also provision for reclassification on the initiative of a producer, a board or the Commission.

The order likewise provides rules for the taking of samples of coal for analyses in accordance with the Bureau of Mines Technical Paper No. 139, of 1933, entitled "Directions for Sampling Coal for Shipment or Delivery." The district boards may require samplings for three consecutive days and producers are required to permit access to coal being loaded for inspection and sampling.

Screen analyses of coals are to be carried out in accordance with the "Proposed Tentative Method of Test for Screen Analysis of Coal" adopted by the American Society for Testing Materials in 1935.

Analyses may be made at any established laboratory recommended by a district board and approved by the Commission and, in the event of disputes or differences in analytical results the Bureau of Mines laboratories or other impartial laboratories may be used.

Montana Mining Association Meets

The annual convention of the Mining Association of Montana was held in Virginia City, Mont., August 6 and 7. Carl J. Trauerman, president of the association, welcomed the delegates in an address in which he traced the growth of the organization, outlined many of its accomplishments, and called attention to the need of a Federal department of mines. Pageants and picnics featured the convention, many of the local residents having grown beards and dressed up as historical characters, including a sizeable crowd of "vigilantes."

Mechanization Trends

Reports of Coal Operators Committees

Report on DE-WATERING WASHED COAL

THE following data covers a method of de-watering washed coal from the Illinois No. 6 seam, bed moisture is 8.5 to 9 percent.

MOISTURE SAMPLING

Special samples are taken for surface moisture determinations.

These are not put in moisture-proof containers, but are weighed immediately after taking and placed in an oven and dried at 50° C. without crushing. The loss is taken as surface moisture. The size of samples taken for surface moisture ranges from 20 lb. for 5/16-in. x 3/4-in. coal to 100 lb. for 3-in. x 6-in. coal.

Total moistures are also determined on samples taken for ash and for other characteristics. These samples are crushed to 6 or 8 mesh, reduced to about 3 1/2 lb., dried at 50° C., then crushed to 20 mesh and final moisture determination is made according to A. S. T. M. standards. The sum of the oven loss and the 20-mesh loss is taken as total moisture.

DE-WATERING METHODS

Unit 1: These units, which de-water the 1 1/2-in. x 6-in. sizes, consist of two double-deck vibrating screens 6 ft. wide by 12 ft. long. The feed is approximately 414 t. p. h. The top deck is wire cloth with 3/4-in. square openings, while the lower deck is wire cloth with 3/32-in. square openings. This separates approximately 25 t. p. h. of 3/32-in. x 3/4-in. undersize from the water. The 1 1/2-in. x 6-in. sizes from Unit 1 are sized on 6-ft. x 16-ft. vibrating type screen into 3-in. x 6-in., 2-in. x 3-in., and 1 1/2-in. x 2-in. products. The moisture figures given are taken after the products are sized.

Unit 2: These units consist of two 6-ft. x 12-ft. double-deck vibrating screens which receive approximately 333 t. p. h. of 5/16-in. x 1 1/2-in. coal. This is sized and de-watered by 3/4-in. square mesh wire cloth on the top decks and 3/32-in. square mesh wire cloth on the lower decks.

The Units 1 and 2 are of the same type and have a 3/4-in. circle stroke at 980 r. p. m. with a pitch of 18° to 20°.

DE-WATERING UNITS				
Unit	Sizes De-watered	Type of Unit	Total	Moisture Surface*
No. 1	Top deck	3 x 6	Double deck	9.2 1.2
	2 x 3	Double deck	9.7 1.8	
	1 1/2 x 2	Vibrating screens	10.2 2.0	
No. 2	Bottom deck	3/32 x 3/4	Vibrating screens	...
	Top deck	3/4 x 1 1/2	Double deck	10.0 2.7
	Bottom deck	5/16 x 3/4†	Vibrating screens	10.7 3.9
		5/16 x 1 1/2	Calculated composite	... 3.3

DE-WATERING SURFACES				
	Unit No. 1		Unit No. 2	
	Top Decks	Bottom Decks	Top Decks	Bottom Decks
Material	Wire	Wire	Wire	Galv. wire
Openings	3/4 x 3/4	3/32 x 3/32	3/4 x 3/4	3/32 x 3/32
Percent open area:				
Life months	2 mo.	4 mo.	2 mo.	4 mo.
Area sq. ft.	144	116	114	116
T.P.H. sq. ft. over.....	2.7	.22	1.34	1.20
T.P.H. sq. ft. through.....	.17	...	1.20	...
R.P.M.	980	980	980	980
Stroke inches (circle).....	3/4"	3/4"	3/4"	3/4"
Pitch	20°	20°	18°	18°

* Special moisture samples.

† Includes 3/32 x 5/16 undersize.

DRYING

No heat or air drying is used.

MOISTURE IN COMBINATIONS OF SIZES DE-WATERED

Size	Wt.	Total	Moisture
	Pct.		Pct.
3" x 6"	30.8	9.2	
2" x 3"	15.6	9.7	
1 1/2" x 2"	10.9	10.2	
3/4" x 1 1/2"	21.7	10.0	
5/16" x 3/4"	21.0	10.7	

Submitted June, 1937, by E. Gammetter, District Committee of Illinois.

National Project Report

The above report and one other just submitted by the District Committee of Illinois make a total of eight reports that have been prepared on De-watering of Washed Coal by the District Committees. The data thus compiled cover the de-watering practices at representa-

tive operations in Pennsylvania, West Virginia, and Illinois.

At the present time the National Project Committee is studying this information and from it will compile the Project Report. The study is complicated by the fact that methods vary from instances where de-watering is accomplished simply by drainage from railroad cars during shipment to methods using various de-watering screens and to operations using both screens and with drying equipment. In order to make a complete report, the committee expects to supplement the data on hand with such additional reports as may be necessary. They also propose to include discussions and comparisons of present moisture determination methods.

As mentioned above, the National Project Committee on Surface Preparation is now engaged in completing this study, and the Project Report should be ready for distribution within the next two or three weeks.

Notes on Mine Pumping Practice, Cripple Creek District

(Continued from page 59)

(d) Because no labor other than an occasional inspection is required, the Cresson air lifts, with their 200-ft. submergence, show a surprisingly low cost. The master mechanic of the mine, Mr. Rorabaugh, obtained his power figures by noting the metered electric consumption of the compressors when air was being furnished only for the air lifts. No horsepower demand charges are included in the costs. The flow of water was measured over a rectangular weir on the drainage tunnel level, recorded continuously for some months by a graphic meter.

(d) The power rate for the present Portland air lift is \$0.0111 per kw.h. and demand charges are included in the costs shown.

Power is delivered to the mines as 23,000-volt, three-phase, 30-cycle alternating current. All power taken underground at the larger mines is now carried in 2,300-volt, three-wire, marine-type cables. Some are lead-covered, but this is not considered essential. The cables are of the semi-self-supporting type. No trouble has been experienced with 2,300-volt service underground even in very wet work. Every precaution is taken to promote safety.

The 30-cycle service is a handicap in the purchase of new electrical equipment. The motors must usually be obtained on special order. This has resulted in the utilization of old motors to a great extent. Many of these have been rebuilt in the mine shops.

Out of the experience of many years in the Cripple Creek district as reported to the writer by the men who have done the work, the following rules can be set forth:

1. Install pump columns, power cables and auxiliary equipment larger in size than is necessary for immediate needs. This will allow for expansion, and savings in power losses will justify the extra investment over a period of years, even though more capacity is never needed.

2. Provide excess capacity and reserve equipment in the way of sinking pumps. This includes spare parts and extra rotor assemblies.

3. Use air-operated pumps, both Cameron sinkers and air-turbine centrifugal pumps, for light work and moderate flows. Under these conditions the power consumption will not be excessive. Electric sinkers are preferable for heavy flows and higher heads. In ordering centrifugals, open impellers should be specified. They are less efficient, it is true, but are less subject to clogging. The motors of electric sinkers should be protected from water as much as possible.

4. Always plan a pump station carefully. Provide as large sumps as consistent with the budget. A provision for easy cleaning saves much labor later.

Settling sumps ahead of the main sumps will help greatly in cutting down pump wear.

5. Allow plenty of room in the design of a pump station for extra pumps. It is very difficult to excavate for space later.

6. Install the water-tight bulkheads in laterals leading out from the pump station. They are cheap insurance. Bulkheads can also be located to control water from development of new areas without shutting off the rest of the level.

8. For moderate flows and heads up to 125 ft., air lifts should be considered if the proper submergence can be obtained and extra compressed air is available without investing in more compressors. Usually the compressor load can be arranged so as to furnish air for the air lift at night or on "graveyard," which will serve to keep the horsepower demand within the normal limits. The elimination of labor costs will often make up for the decreased efficiency.

9. Plan the location of shafts and winzes to avoid large veins which are likely to carry heavy water flows. This, of course, is not always possible when a shaft already existing must be continued.

10. If there is a possibility of the flow from the pump discharges recirculating through open fissures and being pumped over, carry the water in a flume as far as is advisable. In one case in Cripple Creek experience this recirculation problem arose, and after the flow was turned into a flume for a considerable distance the pump load diminished.

11. Last but not least, any operator who is considering sinking a shaft in very wet ground would do well to experiment with some method of grouting ahead to stop or lessen the flow. Not enough work has been done along that line here to permit giving more definite advice on this subject.

The writer realizes that it is one thing to set forth on paper the ideal conditions and point out mistakes, but quite another to attain the former and avoid the latter in practice. In the end, plans for the best pumping arrangements must always be modified in accordance with the investment which can justifiably be made.

Acknowledgment is due Guy Rorabaugh, master mechanic of the Cresson mine, and Clayton Kissell, superintendent of the Ajax mine, for most of the information which made this article possible.

Isle Royale Mine Dewatering

Work of dewatering the Isle Royale Copper Mine preparatory to resumption of production is going steadily ahead, although delay in shipment of 12-in. pipe brought about by labor troubles at the steel mills caused some interruption. Full pumping load when installations are complete will amount to about 2,000 gallons per minute. Repairs are being made at the same time on the company's 2,000-ton mill on Portage Lake, just east of Houghton.

Sectionalizing Power By Automatic Circuit Breakers

(Continued from page 65)

the maximum setting permissible on the automatic breaker unit. To guard against an unfavorable operating condition, a close watch is kept on the extent of the haulage system beyond the reclosing breaker. When the distance becomes great enough to make uncertain the operation of the automatic breaker, the breaker is moved nearer the load area; or if this is impractical, an additional breaker is installed. To check the operation of a breaker, a short circuit is thrown on the system at the furthest point on the section beyond the breaker, and the operation of the breaker observed.

As it works out at our operation, each breaker controls a small load center and completely isolates it from the distribution system in case of trouble. This load generally amounts to from one to three gathering locomotives on one shift, and the same number of mining machines on the other. The section breakers are adjusted to open on comparatively small over-load values which are not greatly in excess of the theoretical load values for the equipment. This makes them highly sensitive and any abnormal or unnecessary overloads are quickly removed from the system. Operators of both locomotives and machines quickly become familiar with the operating characteristics of the breakers, and immediately an interruption occurs controllers are shut off so as to hasten all possible the reclosing of the breaker. This is an important contribution to the maintenance of the electrical equipment and leads to an operating condition in accordance with the manufacturer's recommendations.

In conclusion I want to say it would be very difficult to convince our management that the Wheelwright mine could be satisfactorily operated with a solid trolley system. Short circuits from roof falls which are frequent or overloads from any cause are confined to the one section and do not reach out and affect other sections of the mine. Short circuits that would ordinarily paralyze a large section of the mine are sectionalized, easily located, and quickly cleared. In our district there have been several costly mine fires, which, according to my information, could have been avoided if sufficient automatic reclosing breakers had been installed. While automatic breakers may not be absolute protection from electrical fire hazards, they do offer the best protection I know of because, if properly located, they are more sensitive to grounds than are substation breakers located far off and set to open at higher current values than the sectional breakers.

Automatic circuit breakers, while performing a substantial service in maintaining continuity of operation, also contribute their bit in reducing power costs.

News and Views

of Interest to Mining Men

Coal Conference on Combustion

The first training course in the nature of coal combustion ever held in West Virginia will be conducted at West Virginia University in Morgantown, September 29 and 30, under the auspices of the University School of Mines and the West Virginia Coal Mining Institute. At the close of the coal conference the West Virginia Coal Mining Institute will hold its annual meeting in Morgantown on Friday, October 1, 1937.

The purpose of the course will be to explain to operators and employees the new problems of coal marketing made necessary by the recent enactment of the Bituminous Coal Act of 1937. By explaining many of the important factors in coal marketing, the School of Mines and the Institute hope to equip the state's coal operators and employees with the information needed to obtain and keep new markets in other parts of the country.

Prominent officials of coal companies and coal associations are on the program for the combustion course to explain the main selling points of West Virginia's coal and how the product burns. Tests will be made of the coal and sample analyses will be undertaken during the two days' sessions. It is also planned to demonstrate modern combustion methods and firing of coal at the boilers at the university heating plant.

J. V. Sullivan, secretary of the West Virginia Operators Association, and S. C. Higgins, secretary of the New River Operators Association, will preside at the sessions on the opening day. J. H. Tobe, Appalachian Coals, Inc., and C. A. Reed, director of engineering, National Coal Association, will preside at the Thursday sessions.

The opening address will be delivered by W. E. E. Koeppler, secretary of the Pocahontas Operators Association. The following papers are to be presented: Principles of Combustion, W. W. Hodge, West Virginia University; Some Phases of Coal Sampling, W. D. Steel, chemist, Consolidation Coal Company; Coal Analyses and Their Relationship to Coal Markets, C. J. Allen, combustion engineer, New England Coal & Coke Company; History and Practice of Coal Preparation, P. C. Thomas, vice president, Koppers Coal Company; Principles of Coal Preparation, Professor W. A. Staab, West Virginia University; Sales Practices in Marketing Bituminous Coal, D. T. Buckley, Koppers Coal Company, and

A. W. Richards, president, Ashland Coal and Coke Company; Burning Equipment vs. Coal Selection, H. A. Glover, assistant to the president, Island Creek Coal Company; Burning Coals Mechanically, E. C. Payne, consulting engineer, Consolidation Coal Company; Automatic Heat with Coal, R. S. Lane, Pocahontas Fuel Company; Specifications for Stoker Coal, K. C. Richmond, editor, *Coal Age*; Principles of Boiler Testing, Professor J. B. Grumbein, West Virginia University.

This course is an evolution of the Fellowship in Coal Market Research sponsored by the Upper Monongahela Valley Association, the Monongahela Valley Coal Mining Institute, and the Monongahela System. The course has the warm support of many large coal operators throughout the entire state.

Following the completion of the training course on Thursday, the Coal Institute will hold its annual sessions on Friday, with a banquet on Friday evening at the Morgan Hotel. Inspections of various mines in the territory will take place on Saturday morning, while those present will be able to attend the West Virginia University-University of Pittsburgh football game during the afternoon.

Entertainment features of the meeting will consist of a smoker at the Elks Club, Morgantown, W. Va., on Wednesday evening, September 29, and a get-together at Baron Munchausen Room, Summit Hotel, Summit, Pa., on Thursday evening, September 30.

Metaline Falls Developments

American Zinc Lead and Smelting Company of St. Louis has made important progress recently in its mining operations at Metaline Falls, Wash. Completion of its river-level tunnel, with a length of 4,885 ft., was five months ahead of schedule. From the far end of this tunnel the company has started to diamond drill in various directions, and a raise has also been started to reach one of the ore bodies, explored two years ago from the surface. This development is on the property of Metaline Mining and Leasing Company, optioned to the American Zinc Company. The zinc company is running a survey for a power line to connect a short distance down the river with the new power plant of the Pend Oreille Mines and Metals Company. This will end diesel operations for the American Zinc Company at this point.

The company also has two shifts of diamond drilling crews working on the ground of the Grandview Mining Company, which has been taken over on an option of the American Zinc Company. A 250-ton mill is situated on the Grandview property and is being reconditioned for treatment of ore from the Metaline Mining and Leasing property, where ore bins are already being built. The Grandview mill also will treat any ore opened in that property.

Coal Property Sold

A recent statement filed with the Securities and Exchange Commission revealed that coal properties of Hecla Coal and Coke Company have been acquired by Pittsburgh Steel Company for \$838,000, including 14,629 shares of Pittsburgh Steel common stock, valued at \$512,000. The properties of the Hecla involved in the transaction are in Washington County, Pa.

Colorado Fuel to Move Offices To New York

Executive offices of the Colorado Fuel and Iron Corporation will be moved to New York City this fall. According to present plans, the Denver offices of the corporation will not be disturbed, executives in charge of sales and manufacturing remaining there.

The corporation is enlarging its activities to many branches of the steel business, and recently obtained control of the California Wire and Cloth Company.

Strike at Sunshine Mine Ended

After having lasted for nine days, the strike called by unions affiliated with the C. I. O. on August 1, at the silver mine of the Sunshine Mining Company, near Kellogg, Idaho, was terminated on August 9 when picket lines were dispersed and all miners returned to work. It is reported that no commitments were made by the company to the labor group.

July Anthracite Production Drops

With demand at low ebb and operations at some mines closed down because of strikes, production of anthracite declined in July. According to weekly estimates by the United States Bureau of Mines, production of anthracite for the four weeks ended July 31 totaled 2,280,000 net tons, compared with 3,604,000 net tons during the similar period in 1936, a decrease of about 37 percent. During July, operations at many collieries were only at 50 to 60 percent of capacity, and trade conditions continued quiet, with the industry generally operating on a restricted basis. This recession affected not only the earnings of the coal-producing companies, but also the revenues of the anthracite-carrying railroads.



Miners waiting to go underground at mine of Copper Range Company, Painesdale, Mich. They seem to be happy over 14-cent copper.

Illinois Mineral Industries Conference

Scientific and industrial developments of special significance to the mineral industries of Illinois will be the chief topics of discussion when the fifth annual Illinois Mineral Industries Conference convenes at Urbana on October 8 and 9, sponsored by the Geological Survey Division of the State Department of Registration and Education, the Engineering Experiment Station of the University of Illinois, and the Illinois Mineral Industries Committee.

According to M. M. Leighton, chief of the Geological Survey, the program will include separate sessions on recent developments in coal, oil and gas, clay and clay products, and rock and rock products.

The opening session of the conference will feature an address by Clyde E. Williams, director of the Battelle Memorial Institute of Columbus, Ohio. His subject will be "Research in the Mineral Industries."

Among those who have already accepted invitations to speak at various section meetings are H. A. Buehler, state geologist of Missouri and past president of the A. I. M. E.; T. J. Thomas, of Chicago, assistant to the president of the C. B. & Q. Railroad, president of the Valier Coal Company, and chairman of the Illinois Mineral Industries Committee; William Bell, of Robinson, Ill., president of the Illinois-Indiana Petroleum Association and representative of Governor Horner of Illinois on the Interstate Oil Compact Commission; W. R. Sanborn, of Kankakee, Ill., president of the Lehigh Stone Company; K. C. Richmond, of Chicago, managing editor of *Coal Heat* magazine; Theron Wasson, chief geologist of the Pure Oil Company, Chicago; Walter H. Voskuil, noted mineral economist of the Illinois State Geological Survey; Walter L. Summers, pro-



—Courtesy Explosives Engineer.

fessor of law of the University of Illinois.

Dr. Leighton states that a complete announcement program will be available for distribution on or about September 1. The tentative list of titles for discussion papers concerning coal will probably include the following subjects:

1. Fuel oil as a competitive factor in the domestic fuel market.
2. Changes in the constitution of Illinois coals through preparation processes, and the importance of these changes on utilization.
3. Smoke prevention measures and Illinois coal.
4. Reclamation of refuse at Illinois coal mines.
5. Trends in coal selection for the domestic stoker.

The conference will close on Saturday, October 9, with a luncheon and open meeting of the Illinois Mineral Industries Committee. The meeting will be adjourned in time for attendance at the

Notre Dame-Illinois football game which will be held at Memorial Stadium of the University of Illinois.

New Peak in July Iron Ore Shipments

Lake Superior iron ore shipments in July amounted to 10,704,678 tons, a new record, compared with 10,107,883 in June and 7,159,563 in July, 1936. For the season to August 1, shipments totaled 34,626,751 tons, also a new record high, as compared with 18,837,073 tons for the same period in 1936, and 32,910,819 tons for the similar period in 1929, the previous record year.

Sunnyside Mine to Reopen

The United States Smelting and Refining Company recently announced plans to reopen its Sunnyside Mine at Eureka, Colo., production from which will probably start some time in September. Pri-

marily a lead and zinc producer, the property has been closed since October, 1930.

Dissension in Coal Commission Denied

Denying that there was dissension among members of the Bituminous Coal Commission, indicated by numerous reports that were circulated recently, Chairman Charles F. Hosford, Jr., issued the following statement on August 7:

"Reports are being circulated regarding dissension among members of the Coal Commission. It would appear that persons who failed to prevent enactment of the law are now attempting to hinder its administration and to discredit the commission by insinuations that there are fundamental differences of opinion among those members who represent capital and labor in the industry, as well as between those who represent the public. As a matter of fact, members of the commission do not represent any particular group or interest and all seven are honestly and earnestly assisting in administering the act with due regard to the interests of consumers, miners, distributors, and producers of coal.

"It has been rumored that the commission is deadlocked over the matter of so-called use classifications of coal. The truth is that this subject has not as yet formally come before the commission. It is reported that there is wide difference of opinion as to the salaries to be paid by district boards. In the first place, the expenses of district boards are not paid out of government funds but from assessments levied by the boards upon code member producers. Again, the proposed district board budgets for the fiscal year beginning September 1, 1937, have just been received and are now being analyzed. These budgets have never formally been before the commission.

"It is also rumored that so-called patronage rows have taken place. I am happy to say that the commission has made splendid progress in its difficult task of selecting competent personnel for its work and that there never has been any serious difference of opinion among commission members as to our policy in building up a staff for the Washington and field offices.

"Since its organization, the commission has been required to issue a number of orders dealing with the coal industry, which orders are in many respects highly technical. Great care has been exercised to make sure that the actions of the commission as reflected in the minutes of its meetings meet the requirements of the law.

"The commission has already begun hearings to determine the relationship between interstate and intrastate commerce in coal. All producers of coal have been directed to file reports of costs and realizations. Hearings are being held on the subject of marketing rules and regulations, as well as the discounts to be allowed by code member producers to coal distributors. As a matter of fact,

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THE MINING ENTERPRISE

You are business men interested in one of the most interesting, one of the most hazardous, one of the most useful businesses in our modern society. It is an essential business and you are essential members of that business. That business with every other business is threatened by this movement which is taking place throughout the world. Are you like most business men, cowardly and afraid, or are you prepared to do battle for your conviction that only through the application of the great principle of human enterprise, of individual labor, thrift and responsibility can human society be preserved and go forward to even greater accomplishments? I do not propose to answer that question for you. That is the problem for all of us and upon our answer to it depends in greater measure than ever before in human history, the preservation of a society which recognizes the supreme importance of the individual and the utilization of his labor, thrift and enterprise in making this a better world in which to live. . . .

I do not disparage the aspirations and hopes of those who seek a more equitable distribution of the world's goods. With them I am willing to join, but I insist that in bringing about this condition, they shall not destroy, through ignorance, that principle which has made possible the widest distribution of wealth that has ever existed in any nation on earth. You who are a part of the great industry which exists today through your efforts and the efforts of those who went before you, you who tomorrow will go forth to find new sources of wealth beneath the earth's surface, you who tomorrow in your laboratories will seek to solve still further the great secrets of nature, you who tomorrow will seek to bring together those who wish to invest their stored capital in new enterprises, all must join forces, and, if we together can successfully combat this modern hallucination that there is some magic formula of government which will dispense with the old law embodied in the principle of human enterprise, then we shall have won a victory such as that which first planted our democratic institutions on the shores of America.

Donald A. Callahan

Wallace, Idaho.

(Excerpts from address delivered before the International Mining Convention, Nelson, B. C., July 14, 1937)

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the commission has surprised members of the industry by the speed and thoroughness with which its work has been carried on, and I might add that in this work we are receiving the wholehearted support of members of the coal industry.

"As to differences of opinion, these naturally arise in the administration of any law which deals with complex problems and undoubtedly, as is the case with all legislative and judicial bodies, our decisions will be made with majority and minority opinions.

"As to my resignation, it has been my policy since I was elected as chairman of the first commission to leave with the commission the privilege of making a change in the chairmanship at any time, despite the provision of the law that the chairman is elected for a period of one year. The successful administration of the law means far more than the personal ambition or pride of any commissioner, and I repeat that if, at any time, a majority of the commission feels that its work would be facilitated by a change in the chairmanship, that action can be taken without any objection on my part.

"In the light of these facts I deem it a

fair conclusion to say that rumors of dissension are grossly exaggerated, that all members of the commission are heartily cooperating in the administration of the law and I believe, more than ever, that the Bituminous Coal Act of 1937 will be administered to the great benefit of everyone concerned in the production, distribution, and consumption of coal."

Central Eureka Milling 150 Tons per Day

The Central Eureka Mining Company has reached full production from its property at Sutter Creek, Calif., after more than a year of development work on its Old Eureka Mine property.

A fair grade of ore was mined on the 2,000, 2,100, and 2,300 levels, but it was not until the 2,500 level was opened that ore of good grade in substantial quantities was found. During the past year this ore body has been opened between the 2,500 and 3,000 level with satisfactory results. Diamond drilling and geological studies are being used in directing prospecting work.

Installation of a new 200-hp. hoist, designed for operation to 5,000 feet, was recently completed and put into operation. Extensive repairs have also been made in the 40-stamp mill, which has a daily capacity of 150 tons.

National Coal Association Annual Meeting

The National Coal Association is holding its annual meeting on October 7 and 8 at the William Penn Hotel.

New Mechanized Mining Methods In Oronogo Field

New methods of mechanized mining being inaugurated by the Eagle Picher Mining and Smelting Company at its D. C. and E. Mine in the Oronogo field, Missouri, were scheduled to get under way early in August.

Drag hoists and scrapers for mechanical loading have been installed in the mine, and construction of a long underground conveyor and underground hopper was recently completed.

Mechanical loading equipment has also been installed by the company at its Big John Mine in Kansas. Guy H. Waring, of the Oronogo Mutual Mining Company, is likewise making preparations for installing similar equipment at his company's properties in the Oronogo field.

Silver Cable Mine Taken Over By Federal Mining

Federal Mining and Smelting Company has taken over the Silver Cable Mine at Mullan, Idaho, and will soon start development work on the lead, zinc and silver property. Should additional drifting prove it worth while, the company will install full plant equipment at the property. The agreement between the two companies is provisional, and can be terminated by Federal Mining if full development is not warranted by the project.

International Mining Corporation has moved the offices of its Exploration Department from 29 Broadway, New York, to 630 Fifth Avenue, New York.

"A Cubic Foot of Copper"

Such is the title of a very attractive and informative booklet recently released by Thomas A. Edison, Incorporated, which portrays the importance of Edison's inventions to the industrial progress of the nation—particularly in mining. "A Cubic Foot of Copper" refers to a gift which was made to Mr. Edison following a luncheon given in his honor by a group of distinguished copper producers in 1911. When asked by this group what they might give him as a token of their esteem "the grand old man of the electrical age asked that he be given a cubic foot of copper—said that he had never seen such a cube," to quote from the book.

Brief descriptions are presented concerning the influence of the electrical age on production of copper, lead, zinc, and coal; and the final article depicts the importance of the moving picture industry (the talking movie was another of Mr. Edison's developments) as a consumer of silver for manufacture of films.

Coal Tax Applies to Washed Product

Acting Commissioner Charles T. Russell of the Bureau of Internal Revenue, ruled on August 6, in response to a request by the American Mining Congress, that the tax imposed under Section 3(a) of the Bituminous Act of 1937, applies to washed coal. The tax of 1 cent per net ton applies normally to all coal but when substances "such as rock, shale, clay and pyrite have been removed incident to the preparation of the coal for sale or other disposal" the ruling authorizes the application of the tax to the washed product.

New River Issues New Booklet

The New River Coal Operators Association has recently published and distributed to their sales representatives throughout their market territory a booklet giving detailed firing instructions for users of New River coal.

REAL DUMMIES

Clay, Sand, Rock Dust or other stemming material packed into "Seal-tite" Tamping Bags by the "Dummy Maker" will help solve your shooting problems.

- ▲ The DUMMY MAKER—fills and packs 400 to 500 dummies per hour.
- ▲ SEAL-TITE Tamping Bags—save time and money and eliminate tamping troubles.

THE TAMPING BAG COMPANY

MT. VERNON

ILLINOIS

—Personals—

George A. Roos, formerly assistant general manager, Philadelphia & Reading Coal & Iron Company, has been promoted to the post of general manager, succeeding John R. Sharp.

John R. Sharp, formerly general manager, Philadelphia & Reading Coal & Iron Company, has been made director of the company's Public Relations Department. Mr. Sharp will continue as conciliator for the anthracite operators in District No. 9, United Mine Workers of America.

S. W. Blakslee, formerly production manager in charge of colliery operations of the Philadelphia & Reading for the past seven years, has resigned.



A. B. Jessup

A. B. Jessup recently moved from Jeddoh, Pa., and is now located at Waverly, Lackawanna County, Pa.

William Doell, formerly superintendent of the Ford Motor Company's Blueberry Iron Mine near Ishpeming, Mich., was recently made superintendent of the Cornell iron ore pit of the Globe Iron Mining Company of Iron Mountain, Mich.

George Yaeger has been appointed superintendent of the Emily mine of the Monongahela Rail and River Coal Corporation.

Frank W. Moran has returned to the staff of the MINING CONGRESS JOURNAL as advertising representative after an absence of three years, during which time he has pursued other advertising work in Chicago.

E. H. Allendorfer has been appointed general sales manager of the Pittsburgh and Shawmut Coal Company, with headquarters at Dubois, Pa.

Charles Waldron, for a number of years identified in the coal trade as president of the Financing Fuel Corporation, has been elected president of the Pittsburgh and Shawmut Coal Company in charge of sales and distribution of coal.

George M. Humphrey, president of the M. A. Hanna Company, is now traveling in Europe with his family.

Ralph Watt, formerly employed by the Consolidation Coal Company at Coalwood and Caretta, W. Va., has been appointed assistant superintendent of the Hamilton mine of the Tennessee Coal, Iron and Railroad Company, Pratt City, Ala.

Mrs. E. R. Coombes, who recently resigned her position with the American Mining Congress, is now associated with Mechanization, Inc., which has opened offices in the Munsey Building, Washington, D. C.

J. G. Clarke, president of Gold, Silver & Tungsten, Inc., Boulder, Colo., was in Nevada recently in connection with tungsten mining operations of his company near Fernley.

W. H. Clum is now superintendent of the manganese mines on the Boston Hill properties in Silver City, N. Mex.

Dr. Stephen P. Burke, consulting engineer of Washington, D. C., and formerly chairman of the graduate council and director of the Industrial Science Division, West Virginia University, has joined the staff of the Consolidation Coal Company as director of technical research. He has also been appointed a member of the Bituminous Coal Producers Board for District No. 3.

Joseph Maier has been appointed superintendent of the Costanzo mine of the Wheeling Coal Company.

G. C. Riddell, now in California on professional work, expects to return to New York late in August.

Robert S. Lewis, professor of mining at the University of Utah, expects to return from a South American trip late in August.

O. A. Cunningham has been appointed superintendent of the Dabney mine of the Hutchinson Coal Company.

Herbert S. Salmon, of Salmon and Cowin, Inc., and president of Alabama Coals, Inc., spent several days in Washington recently, appearing before the National Bituminous Coal Commission at a hearing seeking the provisional approval of his organization as a marketing agency for Alabama coal producers. Mr. Salmon is chairman of the South-eastern District of the Program Committee for the Annual Metal Mining Convention and Exposition of the American Mining Congress.

Jerome C. White has become affiliated with the Hanna Coal Company in an operating capacity. Mr. White was formerly on the editorial staff of *Coal Age* and for the past 10 years has been with the Pittsburgh Coal Company as production engineer, and more recently as assistant production manager.



Wm. R. Chedsey

William R. Chedsey has resigned as professor of mining at the Pennsylvania State College after 21 years of service, to accept the position as director of the Missouri School of Mines and Metallurgy at Rolla.

James C. Gray is now superintendent of the Wylam mine of the Tennessee Coal, Iron & Railroad Company, Birmingham, Ala. For the past 12 years Mr. Gray had been mine foreman at the Marvine colliery of the Hudson Coal Company.

Vicente Villamin, active in Philippine mining operations, has been in Washington, D. C., following a trip to London.

A. F. Marshall, formerly safety director of the Pocahontas Operators Association and more recently with the Davis Coal and Coke Company, has been appointed manager of the field inspection force of the Statistical Bureau of the National Bituminous Coal Commission, with headquarters in Bluefield, W. Va.

George D. Cosgrove has resigned as mine inspector of the West Virginia Coal & Coke Company.

L. E. Woods, president of the Crystal Block Mining Company and Crystal Block Coal and Coke Company, has been elected as chairman of the board of directors of the Red Jacket Coal Corporation, succeeding W. W. Ritter, who is retiring from active business.

Howard N. Eavenson, of Eavenson, Alford & Auchmuty, has been in Europe on a pleasure trip, accompanied by Mrs. Eavenson.

Edward D. Scallon, consulting engineer, of Crosby, Minn., was recently made assistant to the president of Butler Brothers, operating iron and manganese properties in the Mesaba and Cuyuna Ranges of Minnesota, and will have headquarters at the company's home office in St. Paul.

Harlow Hardinge, vice president and general manager of the Hardinge Company, Inc., recently returned to York, Pa., from a two months' business trip through the West.

Wm. J. Duncan was recently appointed New York district manager for Koppers Coal Company, with offices at 90 Broad Street. **Harrison G. Ecker**, foreign sales manager, will continue to handle all foreign and marine sales.

Charles Segerstrom, Jr., has completed studies at Harvard University and recently returned to his home in Sonora, Calif., where he will be associated with his father in the many mining projects under his direction in Nevada and California.

John Cosgrove, president, Bituminous Coal Research, Incorporated, was recently in Washington to develop plans with the secretary of the corporation for continuation of its research work.

C. F. Jackson, chief engineer of the Mining Division, U. S. Bureau of Mines, recently returned to Washington from a two weeks' inspection trip of operations on the iron ore ranges of Michigan and Minnesota. He was accompanied by McHenry Mosier and E. G. Gardner, also of the Bureau of Mines, who are still in the area making detailed studies of new developments in open pit mining. Mr. Jackson reports extensive changes in operating practice, mainly in connection with application of truck haulage and belt conveying in open pit operations.

—Obituaries—

S. S. Bernard, for many years a leader in Colorado mining and at one time president of the El Paso Gold Mining Company, died at Pueblo, Colo., June 24.

George H. Utter, a well-known mining engineer, who pioneered many early developments in New Mexico, died on July 3 at the age of 83. He discovered and operated the Cleveland mine near Pinos Altos, N. Mex., which he sold to the Empire Zinc Company, after which he purchased the Carlisle group on the Arizona-New Mexico line, in which he was interested at the time of his death.

Frank A. Manley, recently with the Philadelphia & Reading Coal & Iron Company, died at Pottsville, Pa., on August 2 at the age of 70. He was once vice president of the Union Pacific Coal Company, and later on he was with the O'Gara Coal Company of Illinois.

William Cowell Stephenson, president of the Buckeye Coal and Coke Company, died suddenly on July 15 at Roanoke, Va. Mr. Stephenson was a pioneer operator in the Pocahontas (West Virginia) coal fields.

With the Manufacturer

General Electric Announces New Reclosing Fuse Cutout

A new and radically different fuse cutout, porcelain-housed and with reclosing features, has been announced to the trade by the General Electric Company. The reclosing mechanism is entirely in the door, which is so constructed that it is interchangeable with the door of present G-E 50-ampere indicating and drop-out cutouts, making it possible to convert the latter into reclosing cutouts by adding the new door.

The reclosing door of the new unit contains two fuse holders. Should the first fuse link blow, the door is pushed outward at the bottom—a positive indi-

fault to clear itself and for the arc gases from the outer fuse link to be blown away. This time delay is controlled by a completely housed timing mechanism of the escapement type with free-running gears. It will operate accurately over a long period of time under severe atmospheric conditions and over a wide range of temperatures. Metal parts of the timing mechanism are of noncorroding materials, nickel-plated. Springs are of stainless steel.

If the fault persists, or when another short circuit occurs before the blown fuse link is replaced, the inner fuse link will blow, releasing the toggle mechanism and permitting the door and fuse holder to drop to the open position. In this position the door is completely isolated from the circuit.

The reclosing cutout is available in the 50-ampere rating for 5,000 volts and for 7,500/12,500 GR Y volts; also, the door with the reclosing mechanism is available as a separate item.

New Hard Boiled Hat

Claiming a considerable weight reduction in the new models, E. D. Bullard Company announces a new line of hard-boiled hats which they call "Tuff-Nuts."

The Tuff-Nut is molded in a single-piece crown that is flared at the base to form the brim. Both increased protection and greater comfort is assured through the resiliency and flexibility of the crown. It is nonrigid, and being nonbrittle, does not crack under the impact of blows. The crown is completely weather-resistant.

Perfect ventilation is provided by allowing air space that runs completely around the head between the sweatband and the crown.



cation. After a time delay of 1 second the other fuse holder with its link is connected, thus restoring service if the fault is temporary. Should the second fuse blow, the complete door drops open and is isolated from the circuit.

The two fuse-holder tubes of the new unit are electrically connected at the upper end by a rigid clamp, but are not connected at the lower end. The tubes are held in the door by a clip which permits the door to pivot outward at the bottom, except when held in by the outer fuse link. When the outer fuse link blows the door is released and a spring pushes the door outward a sufficient distance to give clear indication that this link has blown and opened the circuit. A further indication is given by the red end of a transfer contact which becomes visible.

The transfer contact also snaps quickly to the contact on the lower end of the inner fuse holder. It takes 1 second before the snap action occurs, allowing sufficient time for a temporary

A feature of the new Tuff-Nut hat is the plastic sweatband, made from a transparent material that is cool to the feel, self-shaping to the head, and that will not absorb either perspiration or dirt. By merely wiping the band it may be thoroughly dried and completely cleaned. The band is held in the hat with four snap fasteners and may be removed or replaced in a few seconds.

Of particular interest to organizations stocking hats for issuance to workmen is the claim that Tuff-Nuts will cut the required stock investment in half. This is accomplished by placing sweatbands of more than one size in the same crown, which is made possible through the ease and speed with which the plastic sweatband may be snapped into the crown.

The line consists of three models: The Shorty, with short brims, front and back; the Drifter, with short front and side brim and wide back brim; and the Cap. All models are finished in an attractive and weather-resistant olive green.

Circulars are available from the manufacturer, E. D. Bullard Company, 275 Eighth Street, San Francisco, Calif., or from any Bullard branch office or distributor.

New Inspector's Lantern

A new carbide lantern has recently been announced by the National Carbide Corporation, 60 East Forty-second Street, New York City, designed for use by railroads, mining, and various other industries. The lantern is the result of years of manufacturing experience and study of field conditions to develop the ideal light-weight carbide lantern.

It is equipped with a safety flame protector, heat-resisting glass lens, and porcelain burner tips. Of extremely light weight to meet the exacting requirements of car inspectors, the lantern can be used for eight hours on one charge of carbide.

Additional features include an insulated handle to protect the workman against third rails and any exposed electric equipment, positive water-feed control, and a patented rear light of any desired color.

To insure long service and prevent corrosion, brass has been used in making the water and carbide chambers.

A novel and convenient feature of the lantern is the treatment of the threads joining the upper part of the lantern with the carbide chamber. In order to prevent damage when shaking out the contents of the carbide chamber, the female threads have been inverted and placed inside the chamber.

Further details may be obtained through writing to the National Carbide Corporation, 60 East Forty-second Street, New York City.

Reversing Motor Starter

Allis-Chalmers Manufacturing Company Condit Works, Boston, Mass., announces a new reversing motor starter, designated Type AP-7-R, furnished for

7½ hp., 550 volts or less. The starter consists of two Type AP-7 motor starter units, mechanically interlocked so that either unit cannot be closed if the other is closed. The starter units are equipped with Ruptors. The Ruptors consist of enclosing chambers which confine and de-energize the arc formed by circuit interruption. They greatly in-

closed temperature overload relays affording positive motor protection; under-voltage protection inherently provided.

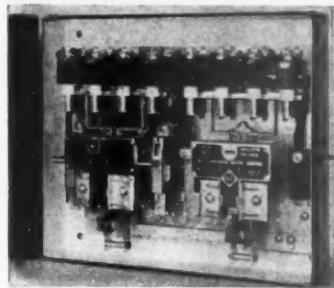
Diesel Engine Application

"Places for Power Supplied by 'Caterpillar' Diesel Engines" is a new booklet issued by Caterpillar Tractor Company.

Made up in convenient and attractive style, the booklet features clear illustrations and concise captions, pointing out the advantages and the economy of Diesel engines in each case.

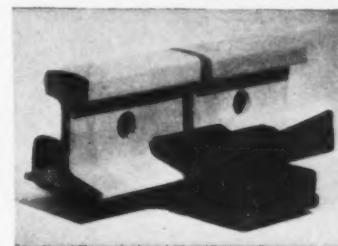
Pumps, mines, hoists, sawmills, flour mills, generator sets, ice plants, oil wells, cotton gins, rock crushers, dredges and general construction work are just a few of the specific applications which the booklet discusses. More than 100 examples are mentioned.

The booklet may be obtained free of charge by writing Caterpillar Tractor Company, Peoria, Ill. The form number is 4127.



crease the interrupting ability of the contacts and form individual isolating barriers between contacts of opposite polarity. Other features are as follows: Large silver double-break contacts—long life—no contact dressing needed; solenoid operated, vertical make and break—silent operation; unit construction—pole units consisting of individual molded bases mounted on a steel chassis—true contact alignment; en-

bolts, and nuts, and embodies several features which offer definite advantages. Ease and speed of applying is accomplished by reason of its special design. The splicer is made in three parts, the main section, wedge plate, and wedge. The main section fits under and flush against the inside of the rails being joined. Two lugs on this part engage the rail holes, and the plate which is held in place by a wedge, locks the splicer against the outside section of rails, and against the rail flange, thus



New Type Rail Splicer

Resistance to corrosion and shock, and the smooth surfaces true to pattern, attained in casting, have been responsible for the use of malleable iron in the manufacture of a new rail splicer for coal-mine tracks which is being marketed by Portable Lamp and Equipment Company, Pittsburgh, Pa. This new splicer eliminates the use of fishplates,

bringing the splicer in direct contact with three sides of the joined rail. Disassembly of the splice to joint is accomplished with equal simplicity.

An added factor is the safety feature of the splicer. Being easy to apply under all conditions, it eliminates the hazard of improperly fastened fishplates and the deterioration of bolts and nuts caused by corrosion from mine water.

PETER F. LOFTUS

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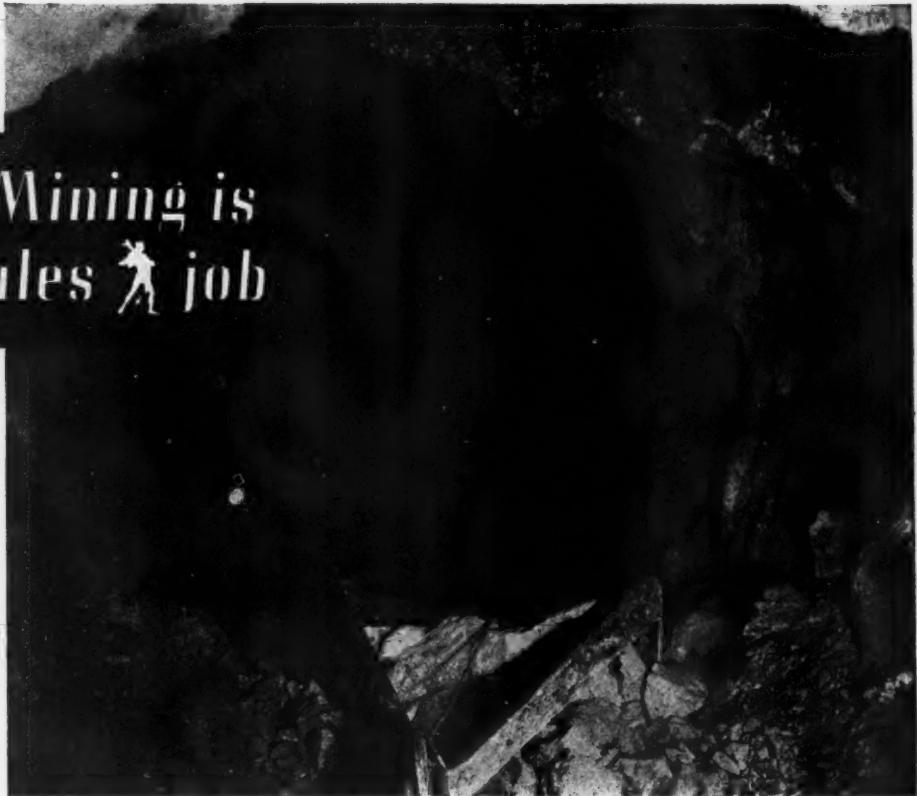


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TIMKEN-EQUIPPED JOY LOADER Handles 1292 Tons in 7 Hours



"Rebel" Streamliners of the
Gulf, Mobile & Northern
R. R. are Timken-equipped.
GLIDE—as you ride a
Timken-equipped train

With 50 TIMKEN Tapered Roller Bearings eliminating friction, carrying radial, thrust and combined loads and holding moving parts in correct and constant alignment, the Joy 11 BU Loader shown in the photograph loaded 333 cars with a total of 1292 tons in one 7 hour shift while engaged on a slabbing operation.

Every mine operator will recognize this as a really remarkable performance—especially those who are used to handling large daily tonnages. The Joy

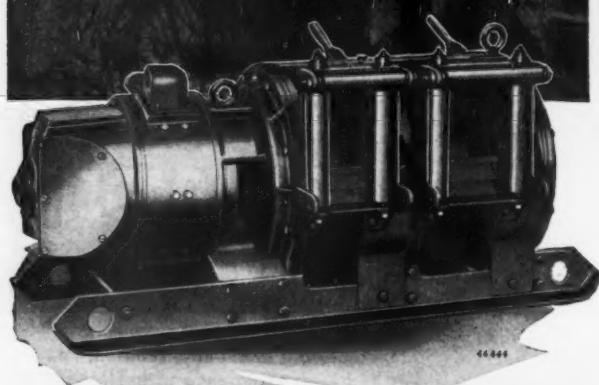
Manufacturing Company, Franklin, Pa., has had long experience with TIMKEN Bearings in coal loading equipment and as a result does not hesitate to place its heaviest responsibilities on them.

Like many other manufacturers of modern mining equipment including mine cars, hoists, conveyors and compressors, they have found that tapered construction plus TIMKEN Alloy Steel is the combination for speed, dependability, endurance and economy. Specify Timken-equipped.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; Timken Rock Bits, and Timken Fuel Injection Equipment.

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TAPERED ROLLER BEARINGS



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*Air or Electric
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Over 180 Sizes
and Types to Choose From*

• If you require powerful and speedy hoisting, scraping or loading, combined with durability, ease of operation and movement, you will always be safe in selecting I-R Hoists. We know the importance of these requirements in underground service and that's why the I-R line is built to give you everything you want in hoisting equipment.

Besides their outstanding features of design and construction, the I-R line of hoists is so complete that there is always a size and type to handle your particular job as though it were specially built for it.

Have an I-R representative call and ask him more about I-R Electric "Tugger" or "Utility" Air Hoists.

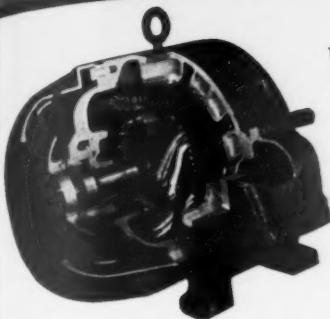
The I-R line includes 1000 sizes and types of air compressors; over 500 different rock drills and pneumatic tools; hoists; pumps and engines for mines, quarries and contractors. Let us help you with your problems.

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Everything Electric FOR METAL MINING

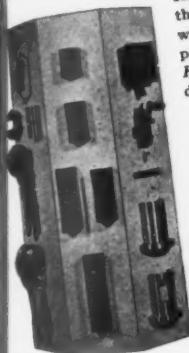
See this equipment, designed for the Industry's Requirements, at the Salt Lake City Exposition, September 7 to 10—Westinghouse Booths 115, 116, 117, 118-A.



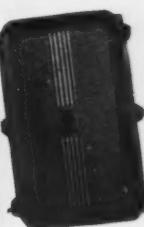
NEW EXPLOSION-PROOF CS (A-C.) MOTOR—Cut away to clearly demonstrate the three new features built into the motor—Dual ventilation, to insure cool operation; Self-cleaning bearings, that need not be dismantled, effectively prevent over-greasing; and complete enclosure of all electrical parts in corrosion-resisting cast enclosure. Available with same features in standard dust-proof design.



NEW EXPLOSION-PROOF SK (D-C.) MOTOR—Cut away to show: New Standards of ventilation—fan is on commutator end, so that pulley, pinion, guard, or driven machine cannot interfere with flow of cooling air; Load closer to bearing, because fan is on commutator end; Ease of Inspection—a single cover at each brushholder gives easy access to interior of motor. The famous SK motor is also available in open, drip-proof, and totally-enclosed designs.



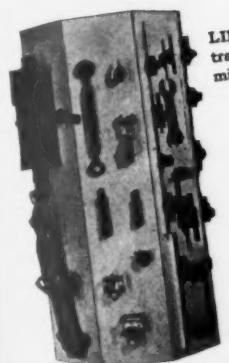
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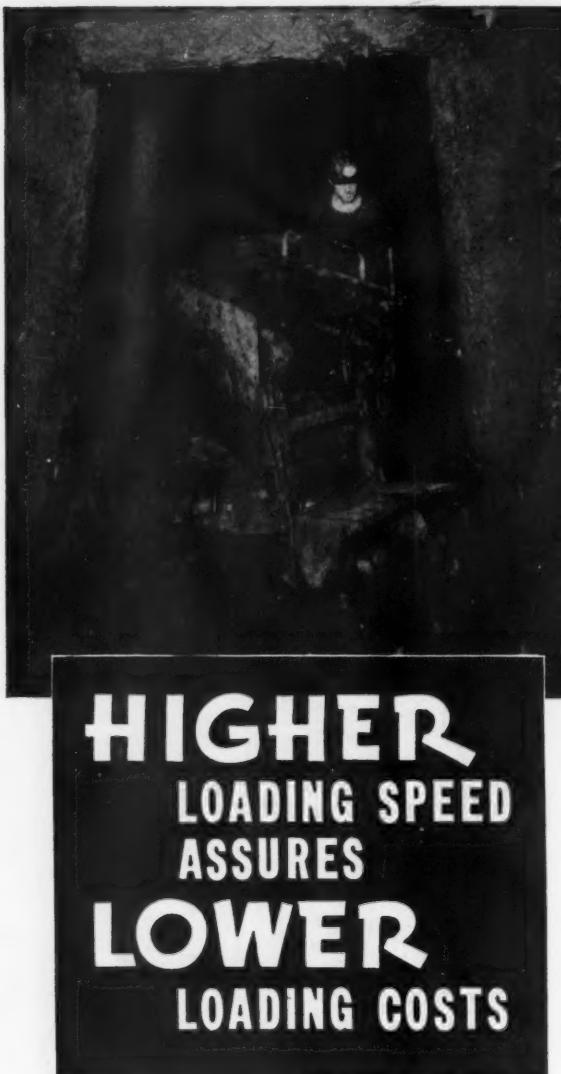
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INDEX TO ADVERTISERS

	Page
Allis-Chalmers Mfg. Co.	14
American Cable Co.	Third Cover
American Cyanamid Co.	8-9
Atlas Powder Co.	7
Bethlehem Steel Co.	3
Climax Molybdenum Co.	21
Edison, Inc., Thomas A.	Front Cover
Electric Storage Battery Co., The	19
Gardner-Denver Co.	82
General Electric Co.	6
Goodman Mfg. Co.	17
Hercules Powder Co.	78
Hoffman Bros. Drilling Co.	77
Ingersoll-Rand Co.	80
Jeffrey Mfg. Co.	13
Koppers Co.	20
American Hammered Piston Ring Division	
Bartlett Hayward Division	
Engineering & Construction Division	
Tar & Chemical Division	
Western Gas Division	
Koppers-Rheolaveur Co.	
The Maryland Drydock Co.	
The White Tar Co. of New Jersey, Inc.	
The Wood Preserving Corp.	
Link-Belt Co.	12
Loftus, Peter F.	77
Ludlow-Saylor Wire Co.	18
Mine Safety Appliances Co.	Back Cover
Ohio Brass Co.	10-11
Pennsylvania Drilling Co.	77
Pierce Management	77
Roberts & Schaefer Co.	22
Robins Conveying Belt Co.	16
Robinson Ventilating Co.	77
Roebling's Sons Co., John A.	5
Sullivan Machinery Co.	15
Tamping Bag Co., The	74
Timken Roller Bearing Co.	79
Universal Vibrating Screen Co.	77
Westinghouse Electric & Mfg. Co.	81



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BETTER LIGHT means BETTER SIGHT—and in a mine, one working place where light is really all-important—BETTER SIGHT means stepped-up efficiency and healthy reductions in general injury rates, with corresponding savings in compensation costs and lost-time charges.

That's why Edison Electric Cap Lamps are the most popular and widely-used miner's lamps in America today—because they do give BETTER LIGHT in every sense of the words . . . *brighter, steadier, better directed to the job, more dependable and durable, easier and cheaper to maintain.*

We can show you plenty of facts and figures to

support these advantages of Edison Electric Cap Lamps. We can show you, also, how you can install these superior lamps in your operations *without a cent of initial outlay*. • Why not make up your mind to switch to Edisons; *it pays dividends all around!*

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